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Akademiya Nauk SSSR

FLORA of the U.S.S.R.

Volume VIII

V. L. Komarov, Editor

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(Flora SSSR)

Volume VIII

Capparidaceae, Cruciferae and Resedaceae

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Family Capparidaceae	Arranged by E.G.Bobrov
Characteristics of the Cruciferae, first key to genera, and all genera not attributed below to other authors	Arranged by N.Bush
Genera Sisymbrium, Torularia, Braya, Syrenia, Roripa, Nasturtium, Myagrum, Chartoloma, Tausheria, Bunias, Goldbachia, Spirorhynchus, Clausia, Malcolmia, Cryptospora, Tetracme, Tetracmidion, Leptaleum, Streptoloma, Diptychocarpus, Chorispora, Sterigmostemum, Anchonium, Trichochiton, Euclidium, Litvinovia, Octoceras, Cithareloma, Lachnoloma, Diplotaxis, Calepina, Camelina, and the second key to genera of the family Cruciferae	Arranged by I.T.Vasil'chenko
Genus Pachypterigium	Arranged by A.V.Yarmolenko
Genera Matthiola, Microstigma, Crambe, and the family Resedaceae	Arranged by E.G.Chernyakovskaya
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Genera Brassica, Sinapis, and Eruca	Arranged by E.N.Sinskaya
Genus Stroganovia	Arranged by N.V.Pavlov
Genus Megacarpaea	Arranged by B.A.Fedchenko

Addenda — Descriptiones plantarum novarum in tomo VIII Florae URSS commemoratarum.

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5523. 8. S. canaliculata Vass. 233
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5525. 10. S. bullata (Aitch. et Hemsl.) B. Fedtsch. 234

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5527. 2. B. cochlearioides Murr. 236

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5529. 2. G. papulosa Vass. 237
5530. 3. G. laevigata (M. B.) DC. 238
5531. 4. G. reticulata (Ktze.) Vass. 241

Genus 607. *Spirorhynchus* Kar. et Kir.

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Tribe 5. HESPERIDEAE O. SCHULZ pro max. pte.

Sepals erect. Silique, rarely a silicle. Nearly always pubescent.

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— 2. H. violacea Boiss. 244
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5548. 6. C. Olgae (Rgl. et Schmalh.) Lipsky 255
5549. 7. C. serawschanica (Rgl. et Schmalh.) Lipsky 255
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5564. 14. P Golenkini Lipsch. 266
5565. 15. P. stenophylla M. Pop. 266
5566. 16 P. siliquosa Krassn. 269
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5568. 18. P. pulvinata M. Pop. 270
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5570. 20 P. microcarpa Ldb. 270
5571. 21. P. exscapa C. A. M. 271
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5573. 1. A. perpusilla Hook. f. et Thoms 272

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5579. 6. M. grandiflora (Bge.) O. Ktze. 280
5580. 7. M. circinnata (Bge.) Boiss 281
5581. 8 M. Karelini Lipsky 281
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5583. 10. M. multisiliqua Vass 282
5584. 11. M. tarasacifolia Balb. 283

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5589. 3. M. runcinata Rgl. 290
5590. 4. M. odoratissima (Pall.) R. Br. 291
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5595. 9. M. fragrans Bge. 293
5596. 10. M. superba Conti 294
5597. 11. M. chenopodifolia Fisch. et Mey. 294
5598. 12. M. Stoddarti Bge. 297
5599. 13. M. bucharica Czerniak. 297
5600. 14. M. oxyceras DC. 297
— 15. M. incana R. Br. 298

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5611. 4. D. integrifolius (L.) C. A. M. 308
5612. 5. D. micranthus C. A. M. 308
5613. 6. D. pectinatus (DC.) Ldb. 309

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5614. 1. D. strictus (DC.) Trautv. 310

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5616. 2. Ch. macropoda Trautv. 312
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5619. 5. Ch. elegans Camb. 315
5620. 6. Ch. tenella (Pall.) DC. 316
5621. 7. Ch. iberica (M. B.) DC. 316
5622. 8. Ch. sibirica (L.) DC. 317

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5624. 2. S. torulosum (M. B.) Stapf 318
5625. 3. S. acanthocarpum Fisch. et Mey. 319

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5626. 1. I. hissarica N. Busch 320

Genus 625. *Anchonium* DC.

5627. 1. A. brachycarpum (Trautv.) Vass. 321
5628. 2. A. elichrysifolium (DC.) Boiss. 321
5629. 3. A. sterigmoides Lipsky 322

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5630. 1. T. inconspicuum Kom. 323

Genus 627. *Euclidium* R. Br.

5631. 1. E. syriacum (L.) R. Br. 323

Genus 628. *Litvinovia* Woron.

5632. 1. L. tenuisrima (Pall.) N. Busch 327

Genus 629. *Octoceras* Bge.

5633. 1. O. Lehmannianum Bge. 328

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5634. 1. Ch. crassifolia Camb. 329
5635. 2. Ch. pamirica Korsh. 329
5636. 3. Ch. maidantalica (M. Pop.) N. Busch 330
5637. 4 Ch. flabellata (Rgl.) N. Busch 330
5638. 5. Ch. linearis N. Busch 331
5639. 6. Ch. parryoides (Cham.) N. Busch 331

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Sepals erect or recurved. Silicle. Hairs nearly always branched.

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5640 1. F. spathulata Kar. et Kir. 332

Genus 632. *Cithareloma* Bge.

5641 1. C. Lehmanni Bge. 333
5642. 2. C. vernum Bge. 334

Genus 633. *Lachnoloma* Bge.

5643 1. L. Lehmanni Bge. 334

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Section 1. Eufibigia Boiss.

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5647. 3. F. eriocarpa Boiss. 337
5648. 4. F. suffruticosa (Vent.) Sweet. 337

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5649. 1. B. incana (L.) DC. 339
5650. 2. B. ascendens C. Koch 339
5651. 3. B. spathulata (Steph.) C. A. M. 339

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5653. 2. A. tortuosum W. et K. 344
— 3. A. artvinense N. Busch 345
5654. 4. A. obtusifolium Stev. 345
5655. 5. A. biovulatum N. Busch 346
5656. 6. A. murale W. et K. 346
5657. 7. A. Fedtschenkoanum N. Busch 347
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5662. 12. A. rostratum Stev. 349
5663. 13. A. calycocarpum Rupr. 350
5664. 14. A. andinum Rupr. 350
5665. 15. A. schemachense N. Busch 350
5666. 16. A. lenense Adams 351
5667. 17. A. daghestanicum Rupr. 352
5668. 18. A. Muelleri Boiss. et Buhse 352
— 19. A. armenum Boiss. 352
— 20. A. macrostylum Boiss. et Huet 353
— 21. A. persicum Boiss. 353
5669. 22. A. minutum Schlecht. 353
5670. 23. A. desertorum Stapf 354
5671. 24. A. umbellatum Desv. 355
5672. 25. A. marginatum Steud. 355
5673. 26. A. Szovitsianum Fisch. et Mey. 355
5674. 27. A. strictum Willd. 356
5675. 28. A. hirsutum M. B. 356
5676. 29. A. campestre L. 357
5677. 30. A. parviflorum M. B. 357
5678. 31. A. Buschianum Grossh. 358

Section 4. Psilonema (C. A. M.) Hook. f.

5679. 32. A. dasycarpum Steph. 358
5680. 33. A. calycinum L. 358

Genus 638. *Meniocus* Desv.

5681. 1. M. linifolius (Steph.) DC. 359

Genus 639. *Ptilotrichum* C. A. M.

5682. 1. P. canescens C. A. M. 360
5683. 2. P. elongatum C. A. M. 361

Genus 640. *Vesicaria* Adans.

5684. 1. V. graeca Reut. 352
5685. 2. V. leiocarpa (Trautv.) N. Busch 352

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5686. 1. Ph. gnaphalodes (DC). Boiss. 363

Genus 642. *Koniga* Adans.

5687. 1. K. maritima (Desv.) R. Br. 364

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5688. 1. C. Jonthlaspi L. 365
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— 3. C. Raddeana Alb. 366
— 4. C. elegans Boiss. et Huet 366

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5690. 5. C. echinata DC. 367

Section 3. Pseucanastatica Boiss.

5691. 6. C. dichotoma Boiss. 367

Genus 644. *Buchingera* Boiss. et Hohen.

5692. 1. B. axillaris Boiss. 368

Tribe 7. DRABEAE SCHULZ

Sepals erect or recurved. Silicle. Hairs various.

Genus 645. *Schiverekia* Andrz.

5693. 1. S. podolica Andrz. 369

Genus 646. *Draba* L.

5694. 1. D. cuspidata M. B. 378
5695. 2. D. scabra C. A. M. 380
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5697. 4. D. heterocoma Fenzl 381
5698. 5. D. globifera Ldb. 381
5699. 6. D. bruniifolia Stev. 381
5700. 7. D. diversifolia Boiss. et Huet 382
5701. 8. D. pilosa DC. 385
5702. 9. D. barbata Pohle 386
5703. 10. D. stenopetala Trautv. 386
5704. 11. D. subcapitata Simmons 387
5705. 12. D. polytricha Ldb. 388
5706. 13. D. araratica Rupr. 388
5707. 14. D. Korshinskyi (O. Fedtsch.) Pohle 389
5708. 15. D. pamirica (O. Fedtsch.) Pohle 389

5709. 16. D. oblongata R. Br. 390
5710. 17. D. micropetala Hook. 390
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5712. 19. D. oreades Schrenk 393
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5720. 27. D. primuloides Turcz. 400
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5722. 29. D. pygmaea Turcz. 402
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5724. 31. D. lactea Adams 403
5725. 32. D. fladnizensis Wulf. 403
5726. 33. D. aradani N. Busch 404
5727. 34. D. subglabra (Rupr.) Tolm. 405
5728. 35. D. siliquosa M. B. 405
5729. 36. D. supranivalis Rupr. 406
5730. 37. D. Alberti Rgl. et Schmalh. 407
5731. 38. D. Fedtschenkoi (Pohle) Gilg. 407
5732. 39. D. physocarpa Kom. 408
5733. 40. D. hissarica Lipsky 409
5734. 41. D. Lipskyi Tolm. 409
5735. 42. D. Arseniewi (B. Fedtsch.) Gilg 410
5736. 43. D. darwasica Lipsky 410
5737. 44. D. odudiana Lipsky 410
5738. 45. D. talassica Pohle 411
5739. 46. D. alajica Litw. 412
5740. 47. D. tibetica Hook. f. et Thoms 412
5741. 48. D. imeretica Rupr. 413
5742. 49. D. mollissima Stev. 414
5743 50. D. ossetica (Rupr.) Somm. et Lev. 414
5744. 51. D. longisiliqua Schmalh. 415
5745. 52. D. nivalis Liljebl. 416
5746. 53. D. camtschatica Andrz. 417
5747. 54. D. Chamissonis G. Don 418
5748. 55. D. Turczaninovii Pohle et N. Busch 418
5749. 56. D. cinerea Adams 419
5750. 57. D. parvisiliquosa Tolm. 420
5751. 58. D. baicalensis Tolm. 421
5752. 59. D. norvegica Gunn. 422
5753. 60. D. altaica (C. A. M.) Bge. 423
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5766. 73. D. ussuriensis Pohle 437
5767. 74. D. kurilensis (Turcz.) F. Schmidt 438
5768. 75. D. sachalinensis F. Schmidt 438
5769. 76. D. borealis DC. 439
5770. 77. D. hyperborea (L.) Desv. 440
5771. 78. D. hispida Willd. 441
5772. 79. D. magna (N. Busch) Tolm. 442
5773. 80. D. subsecunda Somm. et Lev. 443
5774. 81. D. incompta Stev. 444
5775. 82. D. Elisabethae N. Busch 444
5776. 83. D. sibirica (Pall.) Thellung 445
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5778. 85. D. Huetii Boiss. 449
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5780. 87. D. nemorosa L. 451
5781. 88. D. muralis L. 451
5782. 89. D. alticola Kom. 452
5783. 90. D. melanopus Kom. 453
5784. 91. D. Aucheri Boiss. 453

Genus 647. *Erophilu* DC.

5785. 1. E. minima C. A. M. 455
5786. 2. E. praecox (Stev.) DC. 455
5787. 3. E. verna (L.) Besser 456
5788. 4. E. Krockeri Andrz. 456

Tribe 8. BRASSICEAE (HAYEK) O. SCHULZ

Sepals erect or recurved. Silique, fruit fractional or a nutlet. Hairs wanting or simple.

Genus 648. *Diplotaxis* DC.

5789. 1. D. viminea (L.) DC. 457
5790. 2. D. tenuifolia (L.) DC. 457
5791. 3. D. muralis (L.) DC. 458
5792. 4. D. cretacea Kotov 458

Genus 649. *Brassica* L.

Section 1. Brassicotypus Dumort.

5793. 1. B. oleracea L. 460
5794. 2. B. cretica Lam. 461
5795. 3. B. napus L. 461
5796. 4. B. campestris L. 462
5797. 5. B. rapa L. 463
5798. 6. B. elongata Ehrh. 464
5799. 7. B. juncea (L.) Czern. 465
5800. 8. B. Tournefortii Gouan 466

Section 2. Melanosinapis Boiss.

5801. 9. B. nigra Koch 466

Genus 650. *Sinapis* L.

Section 1. Ceratosinapis DC.

5802. 1. S. arvensis L. 467

Section 2. Leucosinapis DC.

5803. 2. S. alba L. 468

Genus 651. *Eruca* Adans.

5804. 1. E. sativa Lam. 469

Genus 652. *Hirschfeldia* Moench

5805. 1. H. incana (L.) Lagr.-Foss. 471

Genus 653. *Rapistrum* Desv.

5806. 1. R. rugosum (L.) All. 472
5807. 2. R. perenne (L.) All. 472

Genus 654. *Cakile* Mill.

5808. 1. C. maritima Scop. 473

Genus 655. *Crambe* (Tourn.) L.

Section 1. Sarcocrambe DC.

5809. 1. C. cordifolia Stev. 477
5810. 2. C. Kotschyana Boiss. 477
5811. 3. C. maritima L. 478
5812. 4. C. pinnatifida R. Br. 479
5813. 5. C. aspera M. B. 480
5814. 6. C. gibberosa Rupr 480
5815. 7. C. Litwinowi Gross. 483
5816. 8. C. tataria Sebeok 484
5817. 9. C. grandiflora DC. 485
5818. 10. C. Steveniana Rupr. 485
5819. 11. C. edentula Fisch. et Mey. 486

Section 2. Leptocrambe DC.

5820. 12. C. armena N. Busch 486
5821. 13. C. koktebelica (Junge) N. Busch 487
5822. 14. C. juncea M. B. 487
5823. 15. C. aculeolata (N. Busch) Czerniak 488
5824. 16. C. orientalis L. 489
5825. 17. C. Gordjagini Spryg. et Pop. 489
5826. 18. C. schugnana Korsh. 490

Genus 656. *Calepina* Adans.

5827. 1. C. irregularis (Asso) Thell. 491

Genus 657. *Raphanus* L.

5828. 1. R. sativus L. 493
5829. 2. R. maritimus Smith 493
5830. 3. R. rostratus DC. 494

5831. 4. R. raphanistroides (Makino) Sinsk. 494
5832. 5. R. raphanistrum L. 494

Genus 658. *Conringia* (Heist.) Pers.

5833. 1. C. orientalis (L.) Andrz. 496
5834. 2. C. austriaca (Jacq.) Sweet 496
5835. 3. C. persica Boiss 497
5836. 4. C. perfoliata (C. A. M.) N. Busch 497
5837. 5. C. planisiliqua Fisch. et Mey. 497

Genus 659. *Sprygina* M. Pop.

5838. 1. S. Winkleri (Rgl.) M. Pop. 498

Genus 660. *Chalcanthus* Boiss.

5839. 1. Ch. tuberosus Kom. 499

Tribe 9. LEPIDIEAE HAYEK

Sepals usually recurved. Silicle dehiscent or indehiscent. Hairs wanting or usually simple.

Genus 661. *Andrzeiovskia* Rchb.

5840. 1. A. cardaminifolia (DC.) Prantl 500

Genus 662. *Lepidium* L.

Section 1. Cardaria (Desv.) DC.

5841. 1. L. draba L. 504
5842. 2. L. Boissieri N. Busch 505
5843. 3. L. repens (Schrenk) Boiss. 505
5844. 4. L. propinquum Fisch. et Mey. 506

Section 2. Lepia (Desv.) DC.

5845. 5. L. campestre (L.) R. Br. 506

Section 3. Lepidocardamou Thell.

5846. 6. L. Borsczovi N. Busch 507

Section 4. Cardamon DC.

5847. 7. L. sativum L. 508

Section 5. Nasturtioides (Medik.) Thelk

5848. 8. L. apetalum Willd. 508
5849. 9. L. ruderale L. 511
5850. 10. L. virginicum L. 512
5851. 11. L. pinnatifidum Ldb. 512
5852. 12. L. perfoliatum L. 512
5853. 13. L. vesicarium L. 513
5854. 14. L. crassifolium W. et K. 514
5855. 15. L. pumilum Boiss. et Bal. 514
5856. 16. L. latifolium L. 515
5857. 17. L. sibiricum Schweigg. 515
5858. 18. L. obtusum Basin. 516
5859. 19. L. amplexicaule Willd. 516

5860. 20. L. cordatum Willd. 517
5861. 21. L. lyratum L. 517
5862. 22. L. lacerum C. A. M. 518
5863. 23. L. eremophilum Schrenk 518
5864. 24. L. ferganense Korsh. 519
5865. 25. L. persicum Boiss. 519
5866. 26. L. karataviense Rgl. et Schmalh. 519
5867. 27. L. Turczaninovi Lipsky 520
5868. 28. L. Meyeri Claus 520
5869. 29. L. coronopifolium Fisch. 523
5870. 30. L. soongoricum Schrenk 523
5871. 31 L. graminifolium L. 524

Genus 663. *Stroganovia* Kar. et Kir.

Section 1. Petiolatae N. Pavl.

5872. 1. S. cardiophylla N. Pavl. 527
5873. 2. S. paniculata Rgl. et Schmalh. 527
— 3. S. persica N. Busch 528
5874. 4. S. affghana (Boiss.) N. Pavl. 529
5875. 5. S. subalpina (Kom.) Thell. 530
5876. 6. S. sagittata Kar. et Kir. 530

Section 2. Sessiles N. Pavl.

5877. 7. S. gracilis N. Pavl. 531
5878. 8. S. intermedia Kar. et Kir. 532
5879. 9. S. Litvinovii Lipsky 533
5880. 10. S. brachyota Kar. et Kir. 533
5881. 11. S. Trautvetteri Botsch. 534
5882. 12. S. robusta N. Pavl. 535

Genus 664. *Hymenophysa* C. A. M.

5883. 1. H. pubescens C. A. M. 536
5884. 2. H. macrocarpa Franchet. 536

Genus 665. *Coronopus* (Rupp.) Gaertn.

5885. 1. C. procumbens Gilib. 538
5886. 2. C. didymus (L.) Sm. 538

Genus 666. *Stubendorffia* Schrenk

Section 1. Alatae N. Busch

5887. 1. S. orientalis Schrenk 539
— 2. S. subdidyma N. Busch 540

Section 2. Apterae Lipsky

5888. 3. S. aptera Lipsky 540
5889. 4. S. Lipskyi N. Busch 541

Genus 667. *Megacarpaea* DC.

Section 1. Orbiculatae B. Fedtsch.

5890. 1. M. orbiculata B. Fedtsch. 542
5891. 2. M. megalocarpa (Fisch.) Schischk. 543

Section 2. Oblongatae B. Fedtsch.

5892. 3. M. gracilis Lipsky 544
5893. 4. M. schugnanica B. Fedtsch. 544
5894. 5. M. gigantea Rgl. 545

Genus 668. *Winklera* Rgl.

5895. 1. W. patrinioides Rgl. 546
5896. 2. W. silaifolia Korsh. 546

Genus 669. *Hedinia* Ostenf.

5897. 1. H. tibetica (Thoms.) Ostenf. 547

Genus 670. *Huichinsia* R. Br.

5898. 1. H. petraea (L.) R. Br. 548

Genus 671. *Hymenolobus* Nutt.

5899. 1. H. procumbens (L.) Nutt. 549
5900. 2. H. puberulus (Rupr.) N. Busch 550

Genus 672. *Iberis* L.

5901. 1. I. saxatilis L. 551
5902. 2. I. taurica DC. 551
5903. 3. I. pinnata L. 551
5904. 4. I. amara L. 552

Genus 673. *Aethionema* R. Br.

Section 1. Isoptera N. Busch

5905. 1. Ae. Szovitsi Boiss. 555
5906. 2. Ae. Lipskyi N. Busch 555
5907. 3. Ae. Voronovii Schischk. 556
5908. 4. Ae. elongatum Boiss. 556

Section 2. Moriera (Boiss.) N. Busch

5909. 5. Ae. transhyrcanum (Czerniak.) N. Busch 557
5910. 6. Ae. spinosum (Boiss.) N. Busch 557

Section 3. Thlaspidopsis N. Busch

5911. 7. Ae. grandiflorum Boiss. et Hohen. 558
5912. 8. Ae. pulchellum Boiss. et Huet 558
5913. 9. Ae. Levandovskyi N. Busch 558
5914. 10. Ae. armenum Boiss. 559
5915. 11. Ae. diastrophis Bunge 559
5916. 12. Ae. schistosum Boiss. et Kotschy 559
5917. 13. Ae. membranaceum DC. 560
5918. 14. Ae. edentulum N. Busch 560
5919. 15. Ae. arabicum (L.) Andrz. 563
5920. 16. Ae. carneum (Soland.) Fedtsch. 563
5921. 17. Ae. cardiophyllum Boiss. et Heldr. 564
5922. 18. Ae. salmasium Boiss. 564

Section 4. Iberidella Boiss

5923. 19. Ae. trinervium (DC.) Boiss. 567
5924. 20. Ae. sagittatum Boiss. 567

5925. 21. Ae. heterophyllum Boiss. 567
5926. 22. Ae. caespitosum Boiss. 568

Genus 674. *Cochlearia* L.

5927. 1. C. arctica Schlechtd. 569
5928. 2. C. lenensis Adams 569
5929. 3. C. oblongifolia DC. 569
5930. 4. C. groenlandica L. 570

Genus 675. *Pseudocamelina* N. Busch

5931. 1. P. Szovitsi (Boiss.) N. Busch 570

Genus 676. *Peltariopsis* N. Busch

5932. 1. P. Grossheimi N. Busch 571

Genus *677. *Pseudosempervivum* (Boiss.) Grossh.

— 1. P. karsianum (N. Busch) Grossh. 572

Genus 678. *Coluetocarpus* Boiss.

5933. 1. C. vesicaria (L.) Holmboe 572

Genus 679 *Didymophysa* Boiss.

5934. 1. D. Aucheri Boiss. 573
5935. 2. D. Fedtschenkoana Rgl. 574

Genus 680. *Dilophia* Thoms.

5936. 1. D. salsa Thomson 575

Genus 681. *Pachyphragma* (DC.) N. Busch

5937. 1. P. macrophyllum (Hoffm.) N. Busch 575

Genus 682. *Thlaspi* (Tourn.) L.

Section 1. Nomisma DC.

5938. 1. Th. arvense L. 581
5939. 2. Th. Hueti Boiss. 581

Section 2. Neurotropis DC.

5940. 3. Th. orbiculatum Stev. 581
5941. 4. Th. armenum N. Busch 582
5942. 5. Th. platycarpum Fisch. et Mey 582
5943. 6. Th. Kotschyanum Boiss et Hoh. 585
5944. 7. Th. Szovitsianum Boiss. 585
5945. 8. Th. umbellatum Stev. 585
5946. 9. Th. perfoliatum L. 585
5947. 10. Th. annuum C. Koch 586

Section 3. Pterotropis DC.

— 11. Th. roseolum N. Busch 586
5948. 12. Th. cochleariforme DC. 587

949. 13. Th. exauriculatum Kom. 587
5950. 14. Th. praecox Wulf. 587
5951. 15. Th. Freyni N. Busch 588
5952. 16. Th. macranthum N. Busch 588
5953. 17. Th. ferganense N. Busch 589

Section 4. Apterygium Ldb.

5954. 18. Th. pumilum Ldb. 589
5955. 19. Th. rostratum N. Busch 589

Genus 683. *Eunomia* DC.

5956. 1. F. rotundifolia C. A. M. 590

Genus 684. *Carpoceras* Boiss.

5957. 1. C. hastulatum (Stev.) Boiss. 591
5958. 2. C. ceratocarpum (Pall.) N. Busch 592
5959. 3. C. brevistylum N. Busch 592
5960. 4. C. stenocarpum Boiss. 592

Genus 685. *Teesdalia* R. Br.

5961. 1. T. nudicaulis (L.) R. Br. 593

Genus 686. *Heldreichia* Boiss.

5962. 1. H. longifolia Boiss. 594

Genus 687. *Peltaria* Jacq.

5963. 1. P. turkmena Lipsky 595
— 2. P. Aucheri Boiss. 595
— 3. P. Voronovii N. Busch 596

Genus 688. *Camelina* Crantz

5964. 1. C. laxa C. A. M. 597
5965. 2. C. albiflora Kotschy 598
5966. 3. C. silvestris Wallr. 598
5967. 4. C. microcarpa Andrz. 599
5968. 5. C. pilosa N. Zinger 600
5969. 6. C. glabrata (DC.) Fritsch. 600
5970. 7. C. linicola Sch. et Sp. 601
5971. 8. C. caucasica (Sinsk.) Vass. 601

Genus 689. *Neslia* Desv.

5972. 1. N. paniculata (L) Desv. 602
5973. 2. N. apiculata Fisch. et Mey. 603

Genus 690. *Capsella* Medic.

5974. 1. C. bursa-pastoris (L.) Medic. 604
5975. 2. C. hyrcana Grossh. 605
5976. 3. C. orientalis Klok. 605

Genus 691. *Subularia* L.

5977. 1. S. aquatica L. 606

Family **LXXI. Resedaceae** DC.

Genus 692. *Reseda* L.

5978. 1. R. luteola L. 608
5979. 2. R. inodora Rchb. 609
- 3. R. odorata L. 610
5980. 4. R. lutea L. 610
5981. 5. R. globulosa Fisch. et Mey. 611
5982. 6. R. brevipedunculata N. Busch 612
5983. 7. R. Aucheri Boiss. 612
5984. 8. R. bucharica Litv. 612
5985. 9. R. dshebeli Czerniak. 615
5986. 10. R. microcarpa Muell.-Arg. 615
5987. 11. R. hemithamnoides Czerniak. 616

PREFACE

The eighth volume of the "Flora of the USSR" describes the families Capparidaceae, Cruciferae, and Resedaceae. Naturally, the major part of this volume deals with Cruciferae. In its historical development this large family is bound up with the Mediterranean region and its vegetational eastern extension in the Caucasus and Central Asia. In the USSR we find many small, distinct genera which are closely linked with semideserts and even deserts. Many other Cruciferae grow in mountainous areas.

N. A. Bush, coauthor and editor of this volume, has carried out detailed studies of Cruciferae of the Caucasus, Siberia, and the Far East. In the present volume he is responsible for the entire section dealing with the Cruciferae of the USSR. Even so, future investigation may well reveal some species which have escaped the attention of taxonomists.

The Arctic-Alpine genus Draba which comprises numerous species was arranged by A. I. Tolmachev, himself an authority on the Arctic flora. I. T. Vasil'chenko, a specialist on weeds, has contributed the sections dealing with those genera with which he has become familiar. Lastly, E. N. Sinskaya, an authority on cultivated Cruciferae (cabbage, mustard, etc.), undertook the work on those genera.

From the combined effort of these specialists there has emerged a well-composed survey of the Cruciferae of the USSR, which will provide future botanists with easily accessible material. The number of genera in this volume is 691, with a total of 5,987 species. The "Flora" is nearing the halfway mark!

The Editors

1 Family LXIX. **CAPPARIDACEAE** LINDL.*

Flowers actinomorphic, calyx of 4, rarely unequal sepals, corolla also of 4 petals; stamens 4 or 6, free, very rarely bases of filament adnate to gynophore, or stamens free and numerous; ovary sessile or borne on a gynophore, which sometimes elongates markedly in fruit; fruit of several carpels, a many-seeded, siliquiform, seldom inflated capsule or fleshy, berrylike. Annual or perennial herbs with glandular hairs and simple, rarely ternate leaves, or slightly woody perennials without glandular hairs, bearing prickly stipes.

Key to Genera

1. Flowers with many free stamens; fruit a fleshy berrylike capsule . . . . 562. Capparis L.
+ Flowers with 4–6 stamens, rarely connate at base; fruit a siliquiform coriaceous, sometimes inflated capsule . . . . 563. Cleome L.

Genus 562. **CAPPARIS** ** L.

L., Gen.pl.(1737) 155; (1754) 222.

Both calyx and corolla of 4 imbricate segments, stamens free, numerous, filaments sometimes hairy; gynophore 2–5 cm long; fruit of several carpels separated by incomplete septa, fleshy, baccate, oblong-obovate to oblanceolate, many-seeded. Herbaceous perennials, occasionally rather woody, with prostrate stems and entire leaves; stipules spiny.

1. Flowers 5–8 cm in diameter; leaves orbicular, obovate or elliptic . . . . 1. **C. spinosa** L.
+ Flowers 1.5–2 cm in diameter; leaves oblong-lanceolate. . . . . 2. **C. rosanoviana** B. Fedtsch.

2 1. **C. spinosa** L., Sp. pl. (1753) 503; Shmal'g., Fl. I, 106. – C. spinosa var. canescens Boiss., Fl. Or. I (1867) 420. – C. ovata M. B., Fl. taur.-cauc. II (1808) 1, III (1819) 361. – C. herbacea Willd., Enum. Hort. Berol. (1809) 560; Ldb., Fl. Ross. I, 234; N. Busch in Fl. cauc. crit. III, 719. – Ic.: Sibth. et Sm., Fl. Gr. V, tab. 486.

Perennial with vertical root up to 10–12 m long; stems numerous, prostrate, up to 1.5 m long; the stipules are straight or curved yellowish spines; leaves rounded-obovate or elliptic, sometimes acuminate at apex, with short petioles, young leaves and branch tips often covered with white tomentose hairs. Flowers 5–8 cm in diameter, solitary, axillary, borne on pedicels which frequently exceed the length of the adjoining leaf; calyx of acuminate-ovate concave sepals bearing short hairs on the outside; petals up to 4 cm long, pale rose, white, or rarely light yellowish, gynophore 3–5 cm long; capsule oblong-obovate 2.5–4.5 cm long and 1.5–3 cm broad, tapering in lower part; seeds 3 mm across, grayish brown, punctate. Fl. May–June, Fr. June–August.

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* Treatment by E.G.Bobrov.

** Name of obscure origin, attributed to Theophrastus and Dioscorides.

Serozems of desert plains, clayey, rocky soils, often solonetzic soils, slopes of low mountain ranges, wasteland and walls of abandoned buildings.— European part: Crim. (S.); Caucasus: all regions (except alpine habitats and high rainfall areas); Centr. Asia: all regions except northern areas, sandy deserts and alpine areas. **Gen. distr.**: Med., E. and W., Bal.-As. Min., Arm.-Kurd., Iran., Dzu.-Kash. Described from S. Europe. Type in London.

Note. The first attempt to distinguish Crimean-Caucasian specimens from the European C. spinosa was made by M. Bieberstein, who separated them as an independent species, C. ovata. As distinguishing characters he noted the following: ovate leaf, soft, white pubescence on young branches, leaves, and herbaceous stems. However, the name he proposed could not be retained, since it had already been used (Desf., 1800). This led Willdenow to introduce a new name, C. herbacea, which was accepted by Ledebour and subsequently by N. A. Bush for Crimean-Caucasian plants. Following the usage of the above-mentioned authors many botanists have referred to the common caper of the USSR by this name. This interpretation was not accepted by Schmalhausen nor by the authors of the "Flora of Central Asia," who continued to refer to the Linnaean name. This we find thoroughly reasonable.

As a matter of fact, such differences in characters as have been pointed out by Bieberstein, also occur in many plants of Central Asia, Spain, North Africa, and others. They are determined by changes in the age of the species and, very significantly, by ecological factors. According to Zakirov, these factors are also evident in the chemical constitution of the plants. It must be noted that earlier West European authors have repeatedly tried to distinguish in this Linnaean species an entire series of
3 varieties and even separate species, but they have had only negligible success.

Economic importance. The flower buds of this plant are of nutritive value and are known under the name of capers. In many parts of the Caucasus they are consumed locally; in the eastern part of Ciscaucasia and in Dagestan they are picked for industrial purposes. In southern Armenia the ripe fruit is eaten raw (Aggeenko). In the Fergana Valley the fruit is also eaten raw and large quantities are stored for the winter. The seeds are used for the extraction of oil.

Chemical analysis of the fruit yields about 18% proteins and about 30% raw fat (Zakirov, Trudy Uzbeksk. Un-ta No. 5, 1936). According to the same author, the common caper is also of interest as a source of nectar. Zakirov also noted the ability of this species to reproduce vegetatively. C. spinosa is cultivated in southern Europe.

2. **C. rosanoviana*** B. Fedtsch. Consp. Fl. Turk. II (1909) 98.

Perennial plants, up to 1 m high; stems many from base, profusely branched, ascending, or more often prostrate; stipules spiny, curved, yellowish, 3–4 mm long, longer than the petiole, leaves oblong-lanceolate, with distinct midrib and inconspicuous lateral nerves, young leaves on short petioles, blades subcoriaceous, their petioles, branches, and stipules with appressed crisp hairs. Flowers 1.5–2 cm in diameter, solitary in axils in upper leaves, long-pedicelled, with crisp pubescence especially at base and in upper part; calyx segments oblong, the outer pubescent, petals yellow, ovary lanceolate, with short gynophore; capsules fleshy, oblanceolate, up to 3 cm long, longitudinally veined, grayish brown. Fl. July, Fr. August. (Plate I, Figure 2).

Limestone, dry rocky exposed foothills, and sands. – Centr. Asia: Pam.-Al. (Babatag, Aryk-Tau, Kurban-Tyube, Kabadian). Endemic. Described from the mountains of Aryk-Tau. Type in Leningrad.

Note. Among the known samples of this species in herbaria, there are some specimens collected in Legman, Tadzh. SSR which show some characters peculiar to C. spinosa; the hybrid nature of these plants is very plausible.

Genus 563. **CLEOME** ** L.

L., Gen. pl. (1737) 200; (1754) 302.

Flowers actinomorphic, calyx of 4 deciduous, rarely unequal sepals; 4 corolla of 4 petals, often with a fan-shaped scale at base; stamens 4 or 6, free, filaments rarely adnate to base of gynophore; ovary sessile or on gynophore, sometimes elongated in fruit. Capsule many-seeded, siliquiform, dehiscent; seeds reniform. Annual, rarely perennial herbs with glandular hairs and alternate, simple, or ternate leaves.

1. Leaves simple, entire . . . . 3.
+ Leaves compound, ternate . . . . 2.
2. Leaflets oblong-lanceolate to linear; flowers to 5 mm long; capsules 1–3.5 cm long . . . . 3. **C. ornithopodioides** L.
+ Leaflets obovate; flowers approximately 2 mm long; capsules 1–1.5 cm long . . . . 4. **C. chrossanica** Bge.
3. Perennial plants, with broad membranous more or less inflated capsules . . . . 4.
+ Annual plants, with siliquiform capsules . . . . 5.
4. Flowers up to 15 mm long, sepals lanceolate; capsules vesicular-inflated, approximately 2 cm broad . . . . 10. **C. coluteoides** Boiss.
+ Flowers approximately 8 mm long, sepals ovate; capsules narrower and less inflated . . . . 11. **C. raddeana** Trautv.
5. Inner perianth segments bear scales in lower part of the claw; stamens 4, free . . . . 6.
+ Inner perianth segments without scales; stamens 6, proximally adnate to gynophore . . . . 7.

---

* After N.M. Rozanov.

** After Cleo, Muse of History; generic name from Priscian, medical writer of the 4th century A.D.

6. Procumbent plants, leaves forming rosette, leaves and base of stem covered with white-tomentose hairs. . . . . 7. **C. tomentella** M. Pop.

+ Bluish green plants, sometimes markedly hairy but not white-tomentose; leaves on lower part of stem base and elsewhere, not forming a rosette 8

7. Flowers in rather dense racemes; filaments much elongated, 2–3 times as long as petals; gynophores 1.5–1.8 cm long . . . . 1. **C. gordjagini** M. Pop.

+ Flowers in very loose racemes, occupying a large part of the stem; filaments elongated, slightly longer than petals; gynophores ca. 1 cm long . . . . 2. **C. turkmena** Bobr.

8. Capsules attenuate-acuminate, beak-shaped; flowers small, 3–5 mm long. . . . . 9.

+ Capsules terete, short-acuminate at tip; flowers larger, 7–8 mm long. . . . . 10.

9. Stem slightly branching, irregularly hispid; lower leaves rounded; capsules 2–3 cm long . . . . 8. **C. lipskyi** M. Pop.

5 + Stem profusely branched at middle, densely covered with hairs up to 0.8 cm long; lower leaves cordate; capsules obpyriform, approximately 1.5 cm long . . . . 9. **C. rostrata** Bobr.

10. Capsules 2–4 cm long, 2–4 mm across, slightly curved, somewhat tapering at both ends . . . . 5. **C. noëana** Boiss.

+ Capsules 1.5–2 cm long and up to 8 mm in diameter, rounded at apex . . . . 5. **C. quinquenervia** DC.

Section 1. **CLEOMOPSIS** Bobr. in Addenda VII, p. 470. – Stamens 6, borne on upper part of gynophore; claws of petals without scales; capsules siliquiform; leaves simple.

Note. In the diagnostic character of cleavage of stamen filaments the species of this section approach the genus Pedicellaria Schrank (in Roem. et Ust. Magaz. III (1790) 10 = Gynandropsis DC. Prodr. I (1824) 238; Endl. Genera (1836–1840) 890, No. 4984; sect. Gynandropsis Boiss. Fl. Or. I, 410), which comprises about 15 species inhabiting the tropics and subtropics. They are distinguished by relatively large flowers, more highly developed gynophores, and compound leaves. The cleavage of stamens of the species described below from the USSR may reflect a convergence to these tropical plants.

In his study of C. gordjagini (Tr. Turk. Nauch. Ob-va I (1923) 15), M. G. Popov postulated a close relationship between this remarkable species and the monotypic Roeperia cleomoides F. v. Müll. of northern Australia. It is difficult to accept this view, since Roeperia has 5 stamens (2 lateral and 3 posterior) with filaments, which are fused at their bases in a manner quite different from C. gordjagini of the USSR.

1. **C. gordjagini** M. Pop. in Kor., Kult. et Pop., Descr. pl. nov. (1915) 51. – Ic.: Ibid., tab. 7.

Annual; stems 50–80 cm high, with a few branches produced close to the base, when young completely tomentose, later hairs confined only to younger parts, with only small and sparse flakes preserved elsewhere; lower cauline leaves 2–4 cm broad; rounded, slightly cordate, petiole 1–2 cm long, not longer than blade; upper surface of leaf with distinct

nerves, petiole and leaves tomentose, especially below; upper cauline leaves ovate, up to 1.5 cm long, on short petioles. Flowers in dense racemes at first, becoming loose due to subsequent growth, pedicels tomentose, not more than 1 cm long, sepals lanceolate, thickly clothed with hairs on the outside, one sepal (up to 7 mm long) larger than the others; petals up to 8 mm long, bright yellow, oblanceolate, with crisp hairs on the outside;
6 stamens adnate to gynophore proximally, filaments elongated, violet in upper part, 2–3 times as long as petals; gynophores declinate, 1.5–1.8 cm long, reddish lilac; capsules siliquiform, 3–4 cm long and 1–1.5 mm broad, slightly curved in the median plane, submoniliform when mature, glabrous, with sparse sessile glands; seeds small. Fl. and Fr. August.

Rocks of low mountains – Centr. Asia: Pam.-Al (Karlyuk, Guzar and Baisun districts). Endemic. Described from the environs of Charshangy in the Karlyuk District. Type in Leningrad.

2. **C. turkmena** Bobr., sp. nova in Addenda VII, p. 470.

Annual; stems 20–50 cm high, branching almost from base, young stems grayish green, irregularly tomentose, the older grayish brown to red, with tomentum confined to scattered flakes; lower cauline leaves rounded, 2–3 cm long, petioles up to 1.5 cm long; leaves and petioles especially tomentose below, middle cauline leaves ovate, on shorter petioles not more than 1.5 cm long. Flowers arranged from middle of stems and their branches, sometimes almost from base, in loose racemes, pedicels to 1 cm long, inflorescence very loose at fruiting; flowers 7–8 cm long; sepals ca. 3 mm long, lanceolate, pilose on outside; petals 6–7 mm long, ovate to oblanceolate, pilose on outside; stamens proximally adnate to gynophore, filaments elongated, somewhat longer than stem; gynophores in fruit up to 1 cm long, reddish, horizontally declinate; capsules siliquiform, 3–4 cm long and 2–3 mm broad, slightly curved, with longitudinal furrows, submonifiliform along sutures when with ripe seeds, younger capsules irregularly floccose, slightly glandular; seeds grayish brown, ca. 2 mm across, covered with sparse hairs. August–October.

White gypseous clays. – Centr. Asia: Mtn. Turkm. (environs of Kara-Kala). Endemic. Described from the left bank of the Sumbar near the town of Kara-Kala. Type in Leningrad.

Note. Differs from preceding species in its very loose inflorescences, smaller flowers, shorter gynophore. The fruiting pedicel is half as long, and the capsule is broader.

Section 2. **SILIQUARIA** DC., Prodr. I (1824) 239, pro min. parte. – Stamens 6, free; petal claws without scales; capsules siliquiform, sublinear; leaves ternate.

9 3. **C. ornithopodioides** L., Sp. pl. (1753) 672; M.B., Fl. taur. cauc. II, 130; III, 452; Boiss., Fl. Or. I, 411; Shmal'g., Fl. I, 106; N. Busch in Fl. cauc. crit. III, 4, 711. – C. iberica DC., Prodr. I (1824) 240; Ldb., Fl. Ross. I, 234. – C. virgata Stev. in DC., l. c., non Thunb. – C. canescens Stev. in DC., l. c., p. 241; Ldb., l. c. – C. steveniana Roem. et Schult., Syst. Veg. VII (1829) 40; Ldb., l. c. – Ic.: Sibth. et Sm., Fl. Graeca VII (1830) 650. – Exs.: Fl. cauc. exs. No. 37.

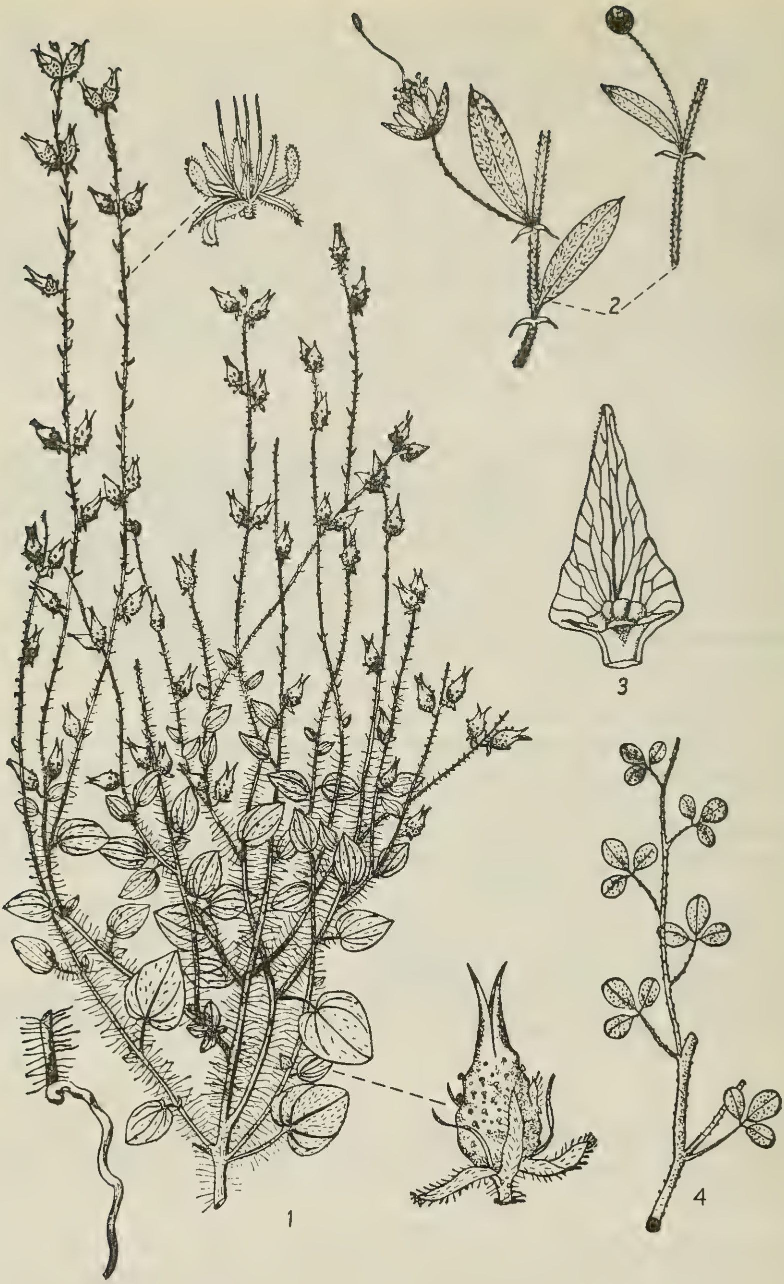

PLATE I. 1 — Cleome rostrata Bobr.: general appearance, flowers, capsule; 2 — Capparis rosanoviana B.Fedtsch.: part of stem with flower and flower-bud; 3 — Cleome noëana Boiss.: petals with scales at base; 4 — C.chorossanica Bge.: branch with leaves.

Annual; stem erect, profusely branched from middle, 20–40 cm high, scabrous with glandular bristles; leaves ternate with petioles not longer than leaflets; leaflet entire, oblong-lanceolate to linear, 1–1.5 (-2) cm long, on very short petioles, glandular (like stem), upper bracts solitary, smaller, subsessile Inflorescence a terminal raceme, considerably elongating in fruit; peduncles horizontally declinate, slender, filiform, 7–15 mm long, grayish-brown; outer perianth segments oblong to subtriangular, acuminate, often with blackish margin, 1–2 mm long, inner segments pinkish, reddish, or white, up to 5 mm long, with a broad-ovate fold tapering into a claw; stamens 6, filaments filiform, later elongated; capsules siliquiform, narrow, sublinear, 1–3.5 cm long, when mature; valves with prominent longitudinal ribs, glandular, pointed at apex, on 2–10 mm long pedicels (α stipitata Boiss., l. c.) or sessile (β sessilis Boiss., l. c.) horizontal or pendulous peduncle; seeds smooth, reddish brown, ca. 2 mm long. Fl. June–July, Fr. July–August.

Rocky debris of hillsides, gravels of river drifts, sometimes rubbish dumps. – European part: L. Don (Ekaterininskaya Station on the Donets River), Crim.; Caucasus: all regions; Centr. Asia: Pam.-Al. (Shugnan). **Gen. distr.**: E. Bal.-As. Min., Arm.-Kurd., Iran. (to east Afghanistan). Described from environs of Istanbul (Constantinople). Type in London.

Economic importance. This plant is known as "Levant mustard," and its seeds are used as a substitute for common mustard; the same applies to other species of Cleome.

4. **C. chorossanica** Bge. in Boiss., Fl. Or. I (1867) 412.

Annual; stems erect, profusely branched almost from base, 20–50 cm high, diffusely covered with glands, grayish brown; leaves ternate with petioles, lower leaves with petioles longer than leaflet, the upper on shorter petioles, leaflets entire, obovate to oblanceolate, obtuse, reddish-grayish brown above, grayish beneath, bracts solitary, oblanceolate, subsessile; leaves and petioles diffusely glandular. Inflorescence a terminal raceme, 10 elongated in fruit; peduncles slender, declinate, ca. 1 cm long; flowers small, outer perianth segments obovate, 1–2 mm long, inner segments lanceolate, slightly longer than or equal to outer segments; stamens 6, filaments elongated after flowering; capsules siliquiform-narrow, 1–1.5 cm long, when mature submoniliform, valves with inconspicuous, fine, longitudinal nerves, glands slender and diffused. Fruit acuminate at apex, borne on pedicel 1–3 mm long, horizontally inclined; seeds smooth, brownish, ca. 2 mm long. Fl. July, Fr. August. (Plate I, Figure 4).

Rocky slopes and gravel deposits. – Centr. Asia: Mtn. Turkm. (Kushka district, environs of Kushka). **Gen. distr.**: Iran. (E. Iran and Herat Province, Afghanistan). Described from environs of Meshed. Type in Leningrad.

Section 3. THYLLACOPHORA Franch. in Morot, Journ. Bot. I (1887) 37. – Stamens 4, free; petals with claws bearing a fan-shaped scale at base; capsules siliquiform, relatively broad; leaves simple.

5. **C. quinquernervia** DC., Prodr. I (1824) 239; Boiss., Fl. Or. I, 415; Franch. in Morot, Journ. Bot. I (1887) 38. – Ic.: Franch., l. c., p. 39.

Annual, 10–20 cm high; stems divaricately branching from base, scabrous, hispid, glandular, lower leaves rounded-cordate, up to 3 cm long and as broad in lower part; petioles sometimes nearly twice as long as leaves; cauline leaves smaller, with shorter petioles; upper bracts small, lanceolate, sessile. Lower leaves usually with 5, sometimes only 3, prominent nerves. Large leaves sometimes with 7 nerves; leaves and petioles hispid-glandular. Inflorescence rather dense at the beginning of flowering; short and loose at flowering; flowers yellowish, ca. 7 mm long, with narrowly hastate petals, with rounded and undulate-margined basal scale; capsules oblong, obtuse, subsessile, on horizontal pedicels, capsules twice as long as the pedicels, 1.5–2 cm long, up to 0.6 cm broad. Outer valves torulose, hispid-glandular. Fl. July, Fr. August.

Clays, limestone, and rocky slopes. – Centr. Asia: Kyz. K. (outlying mountains of the southern part of the district), Ar.-Casp. (western Ust-Urt). Gen. distr.: Iran. (Described from Iran). Type in Paris.

6. **C. noëana** Boiss., Diagn. pl. nov. ser. II, 1 (1853) 48; Ej., Fl. Or. I, 415; M. Pop. in Kor., Kult. et Pop., Descr. pl. nov. (1915) 55. – Ic.: M. Pop., l. c., tab. 10.

Annual; stems 20–60 cm high, sometimes several branches almost from base, glandular, hispid; lower leaves rounded, cordate, up to 5 cm long and broad; petioles almost as long as blade; prominently 7-nerved, hispid-
11 glandular like the petioles; middle cauline leaves smaller, on short petioles; upper bracts small, rounded-cordate, acuminate, sessile. Inflorescence elongated, 8–20 cm long, dense at first, elongating and becoming loose during flowering; flowers yellowish, ca. 8 mm long, with bristly sepals and pedicels; petals hastate, 7 mm long, with undulate scale at base; capsules 2–3–4 cm long, 2–4 mm across, slightly curved, tapering at both ends, on short, somewhat recurved pedicel ca. 1 cm long, valves rugose-tuberculate, scabrous, hispid, glandular. Fl. July, Fr. August. (Plate I, Figure 3).

Rocky slopes of low-mountain areas; in Shugnan at 1,800 m above sea level. – Centr. Asia: Kyz. K. (outlying mountains south of the district), Mtn. Turkm. (Firyuza), Syr D. (Fergana), Pam.-Al. Gen. distr.: Iran. Described from Iranian Kurdistan. Type in Geneva, cotype in Leningrad.

Note. This species is highly polymorphous and is consequently divided into the following varieties: 1) var. genuina Bornm. (ap. M. Pop., l. c.), leaves obtuse, on long petioles, capsules 2.5–3 cm long; 2) var. persepolitana Bornm. (ap. M. Pop., l. c., olim pro sp. pr. in herb.), capsules as long as in preceding variety, leaves obtuse, with long petioles; this variety is known from Iran; 3) var. hispida Bge. (in A. Fedch. Putesh. v Turk. 18 (1881) 12), capsules short, stout, identical with those of C. quinquenervia DC. The Darvaz plants also differ in their capsules, which bear blackish glands; capsules on slender pedicels, almost sessile, while the whole plant is less bristly. As previously noted, var. hispida Rgl. is identical with C. quinquenervia; nevertheless, plants collected in the outlying mountains of southern Kyzyl-Kum have been included in the latter species because in the area of Soviet Central Asia the relationship between C. quinquenervia and C. noëana is still obscure.

7. **C. tomentella** M. Pop. in Kor., Kult. et Pop., Descr. pl. nov. (1915) 52. – Ic.: Ibid., tab. 8.

Annual; stems 15–30 cm high, often numerous (from 2 to 20), branching almost from base, white-tomentose below, profusely glandular above; leaves clustered on lower part of stem, forming a sort of rosette, leaves 3–8 cm broad and sometimes slightly longer, lower leaves rounded, cordate, somewhat acuminate; petioles longer than leaves; upper leaves rather smaller, ovate, like petioles, and all other leaves densely white-tomentose, especially below. Inflorescence short, dense, markedly elongating in fruit, and becoming loose; bracts small, linear; pedicels shorter than flowers; flowers yellowish, up to 6 mm long; sepals ca. 3 mm long, obtuse, oblong-linear, pilose, glandular; petals lanceolate, expanded in the center, pilose, bearing 12 pocket-shaped scales below; anthers up to 3 mm long, filaments elongated after flowering; pilose, glandular pedicels ca. 1 cm long bears capsule ca. 2 cm long, attenuate-acuminate, rather curved, with slightly tuberculate, glandular, pilose valves; seeds reddish-grayish brown, glabrous, ca. 1.5 mm across. Fl. July, Fr. August–September.

Variegated gypseous rocks of low mountains. — Centr. Asia: Pam.-Al. (foot of the Kugitang Range, south of the Karlyuk District, environs of Kelif; Baisun). Endemic. Described from Baisun. Type in Tashkent.

8. **C. lipskyi** M. Pop. in Kor., Kult. et Pop., Descr. pl. nov. (1915) 54. — Ic.: Ibid., tab. 9.

Annual; stems 15–45 cm high, slightly branching, reddish-grayish brown, irregularly covered with bristles; lower cauline leaves on pale petioles up to 4 cm long, blade yellowish green, rounded, 2–4 cm broad, cordate, with 5–7 nerves prominent below, more bristly below than above, with scattered glands along the margin and sometimes also on the surface of the blade; upper leaves ovate, up to 1 cm long, acuminate showing a gradual transition into linear bracts. Flowers in dense racemes, becoming loose with growth, small, yellowish, on short pedicels ca. 2–3 mm long; calyx ca. 3 mm long, with ovate segments slightly shorter than petals; petals ovate, with attenuate-acuminate hispid tip, with basal scale; filaments reach twice the length of the perianth; pedicels of ripe capsule ca. 1 cm long, with short pubescence; capsule oblong, 2–3 cm long, tapering to a slender point, proximal diameter 4–6 mm, valves scabrous, torulose, except for beak covered with yellow glands on light hyaline pedicels; seeds pale grayish brown, ca. 1 mm across. According to Popov, the entire plant has the pungent odor of asafetida. Fl. and Fr. August.

Variegated rocks of low mountains. — Centr. Asia: Pam.-Al. (in the Denau, Baisun and Guzar districts). Endemic. Described from the Baba-Tag Range. Type in Tashkent.

9. **C. rostrata** Bobr., sp. nova in Addenda VII, p. 470.

Annual; stems 15–40 cm high, grayish brown, profusely branched in the middle, densely pubescent in lower and middle parts, with remote, white, slender hairs to 0.8 cm long; lower leaves on petioles up to 2 cm long, blade cordate, somewhat acuminate, up to 4 cm long and 3 cm broad, with 5 nerves prominent on lower surface, upper surface yellowish green, with sparse long hairs, under surface glaucus, densely pilose; middle leaves of stems and branches ovate, borne on short petioles, acuminate, 3-nerved; terminal part of stems covered with subulate sessile bracts 0.6 cm long. Upper part of inflorescence dense at first, but becoming very loose in fruiting; flowers ca. 5 mm long, on very short pedicels; sepals oblong,

acuminate, pilose, up to 5 mm long; petals very slender (yellowish?), oblong-
13 lanceolate, ciliate along margin and lower surface, not longer than sepals; sepals with scale at one-third its length; stamens 4, filaments lengthening after flowering to 10 mm; capsule on pilose pedicel 0.5–0.7 mm long; capsule obpyriform, attenuate-acuminate, ca. 1.5 cm long, 5–6 mm across in lower part, individual valves cleft, beak-shaped, scabrous on the outside, except for the rostellum entire surface torulose, with yellowish glands on pale pedicels; seeds light grayish brown, ca. 1 mm across. Fr. October. (Plate I, Figure 1).

Pebble beds. – Centr. Asia: Pam.-Al. (Parkhar District; from the village of Kzyl-Su to Sarai-Komar). Endemic. Described from above locations. Type in Leningrad.

Note. Differs from C. lipskyi by its more branched and long-haired stems, by its cordate lower leaves which are one-half to one-third as big and by obpyriform beak-shaped capsules on shorter pedicels.

Section 4. **BUHSEA** Bge. in Del. Sem. Horti Dorpat. 1859; ej. in Linnaea XXX (1859) 752, pro genere. – Stamens 6, capsule vesicularly inflated, leaves simple.

10. **C. coluteoides** Boiss., Diagn. pl. or. ser. I, 1 (1842) 3. – Buhsea coluteoides Bge. in Del. Sem. Horti Dorpat. (1859) 41; ej. in Linnaea XXX (1859) 752; Boiss., Fl. Or. I, 416. – Buhsea trinervia Stapf in Bot. Ergebn. II (1886) et B. Fedtsch., Consp. Fl. Turk. II (1909) 97, non Cleome trinervia Fresen. – Cadaba trinervia DC., Prodr. I (1824) 244. – Ic.: Popov in Kor., Kult. et Pop., Descr. pl. nov. (1915) tab. 12.

Perennial; stems numerous, 20–40 cm, ascending or somewhat divergent, simple, rarely slightly branched, covered with sessile glands; lower leaves ovate to rounded, with petioles up to 1.5 cm long, 3–5-nerves prominent on lower side, upper leaves subelliptic, sessile; all leaves rather fleshy and covered with glands. Flowers in axils of upper leaves on glandular pedicels, ca. 1.5 cm long; sepals lanceolate, glandular, ca. 4 mm long; petals yellow with red nerves, unguiculate, ca. 10 mm long, fold obovate, ca. 5 mm broad and more than half as long as the entire petal, claw very narrow; stamens 6, 6–8 mm long; capsules with membranous valves, pendulous on pedicels up to 1.5 cm long, inflated when mature, 3–4 cm long and to 2 cm broad, oblanceolate, obtuse, mucronate, nearly indehiscent; seeds ca. 2.5 mm across, grayish-brown, velutinous. Fl. April, Fr. May.

Foothills and low-mountain zones, slopes with silt-rock debris and
14 dry riverbeds, rare in steppes. – Centr. Asia: Mtn. Turkm. (Bolsh. Balkhany, Kopet-Dag.). **Gen. distr.**: Iran. Described from Baghdad. Type in Geneva.

11. **C. raddeana** Trautv. in A. H. P. I (1872) 20, 270; ibid., V, 410; ibid., IX, 441; Boiss. et Buhse, Fl. Or. Suppl. (1888) 68; Litw. in Tr. Mus. Bot. Ac. Sc. I (1902) 44; Pop. in Kor., Kult. et Pop., Descr. pl. nov. (1915) 57. – Ic.: Pop., l. c., tab. 11. – Exs.: HFR No. 1407.

Perennial; similar to preceding species, from which it differs by the following characters: flowers not more than 8 mm long, sepals ovate, ca. 2 mm long, petals ca. 6–7 mm long, capsules less inflated, narrower and flatter, and more readily dehiscent, upper capsules 3–4 cm long and 1 cm across, slightly curved, often remain on stem. Fl. April, Fr. May.

Rocky slopes and dry valleys. — Centr. Asia: Kara Kum (environs of Krasnovodsk); Mtn. Turkm. (Kyuren-Dag). Endemic. Described from Krasnovodsk. Type in Leningrad.

Family LXX. **CRUCIFERAE** B. JUSS.

B.Juss.in Hort.Trian.(1759) et A.L.Jussieu, Gen.(1789) p.LXVII et 237.

Flowers in racemes or corymbs, usually ebracteate, bisexual, actinomorphic, hypogynous. Sepals 4 (2 + 2), usually deciduous. Petals 4, alternating with sepals tapering at base into a claw; flowers very rarely apetalous. Stamens 6, 2 shorter than the rest; filaments of longer stamens sometimes fused in pairs; very rarely 4 or 2 stamens. Single pistil of 2 carpels, ovary usually bilocular; style more or less short; stigma capitate or bipartite. Fruit elongate (silique) or short (silicle), with 2 (very rarely 4) dehiscing valves and persistent septum which bears seeds along margins; fruit rarely a loment or unilocular, 1-seeded, indehiscent (nutlet). Seeds exalbuminous. Embryo curved either: 1) pleurorhizal, i.e., with radicle hugging edge of flat cotyledons or 2) notorrhizal, i.e., with radicle bent over the back of one of the cotyledons; in this case, the cotyledons may be flat or folded lengthwise or folded so that the cross section of the seed cuts them transversely two or more times. Annuals, biennials, perennials, or rarely undershrubs or shrubs, with alternating, rarely only radical leaves, glabrous or often covered with simple or branching unicellular hairs, rarely multicellular glandular hairs.

A recent monograph of the Cruciferae by O. E. Shul'ts (Die nat. Pflanzenfam. Band 17b. 1936) lists 351 genera with about 3,000 species.

Among the 127 genera known to occur in the Soviet Union 25 are
15 Mediterranean, 4 Mediterranean-Near Asian, 21 Caucasus-Near Asian, 12 Near Asian-Central Asian, 31 Central Asian, 10 Siberian mountainous, 15 Boreal, 6 Arctic-Alpine, 1 Arctic (Cochlearia), and 2 quasi-cosmopolitan (Lepidium and Sisymbrium).

The general geographic character of the family is Mediterranean, in the broad sense of the word used by Engler.

Note. The Cruciferae is one of the most natural families. Its genera are rather similar and as yet no one has proposed a satisfactory phylogenetic scheme of this family. As Hayek's (1911) system is the most acceptable, it has therefore been used in this volume. Only the Sisymbrinae have been arranged according to O. E. Shul'ts (1924 and 1936).

Key to Genera*

1. Plant pubescent, covered with simple hairs, sometimes intermixed with glandular hairs, or glabrous . . . . 2.
+ Plant pubescent, with branched hairs . . . . 94.
2. Plants scabrous (petals may be pubescent) . . . . 3.
+ Plants pubescent, covered with simple hairs (sometimes intermixed with glandular hairs) . . . . 63.

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* See also Key on p.461.

3. Fruit a silique . . . . 4.
+ Fruit a silicle . . . . 23.
4. Siliques indehiscent . . . . 606. **Goldbachia** DC.
+ Siliques dehiscent . . . . 5.
5. Flowers yellow . . . . 6.
+ Flowers white or pink-purple . . . . 11.
6. Seeds very small (not more than 0.5–0.75 mm). Siliques flat, oval . . . . 7.
+ Seeds larger. Siliques long, linear . . . . 8.
7. Leaves ovate, entire . . . . 564. **Taphrospermum** C. A. M.
+ Leaves emarginate-dentate to pinnate . . . . 587. **Roripa** Scop.
8. Seeds spherical, embryo with folded cotyledons. . . . . . . 647. **Brassica** L.
+ Seeds elongate, embryo pleurorhizal or notorrhizal . . . . 9.
9. Embryo notorrhizal . . . . 658. **Conringia** Adans.
+ Embryo pleurorhizal . . . . 10.
10. Siliques compressed, valves flat with a slightly prominent midrib . . . . 594. **Arabis** L.
+ Siliques subtetragonous, valves carinate, with strongly prominent median nerve . . . . 584. **Barbarea** R. Br.
16 11. Embryo with folded cotyledons . . . . 659. **Spryginia** M. Pop.
+ Embryo pleurorhizal or notorrhizal . . . . 12.
12. Embryo notorrhizal . . . . 13.
+ Embryo pleurorhizal . . . . 20.
13. Perennials . . . . 14.
+ Annuals (rarely biennials) . . . . 17.
14. Petals white . . . . 15.
+ Petals pink or purple . . . . 16.
15. Leaves pinnate . . . . 570. **Phryne** Bub.
+ Leaves entire . . . . 567. **Eutrema** R. Br.
16. Large plants (up to 50 cm), with stout tuberlike root and reniform-cordate lower leaves . . . . 660. **Chalcanthus** Boiss.
+ Plants smaller (10–25 cm high), root not tuberlike. Lower leaves oblong-obovate, tapering into petioles; cauline leaves sagittate, sessile . . . . 612. **Malcolmia** (L.) R. Br. (M. Meyeri).
17. Flowers bluish pink . . . . 576. **Thellungiella** Schulz.
+ Flowers white . . . . 18.
18. Siliques bear flat horns . . . . 661. **Andrzeiovskia** Rchb.
+ Siliques hornless . . . . 19.
19. Siliques 30–90 mm long . . . . 658. **Conringia** Adans.
+ Siliques 12–16 mm long . . . . 576. **Thellungiella** Schulz.
20. Two rows of seeds in each carpel . . . . 589. **Nasturtium** R. Br.
+ One row of seeds in each carpel . . . . 21.
21. Valves without midrib (or midrib obscure) . . . . . . 591. **Cardamine** L.
+ Valves with distinct midrib 22
22. Siliques broad, flat, sessile or borne on long slender gynophore . . . . 564. **Macropodium** R. Br.
+ Siliques narrow, linear, without gynophore . . . . 594. **Arabis** L.
23. Silicles indehiscent* . . . . 24.
17 + Silicles dehiscent . . . . 42.
24. Flowers yellow . . . . 25.
+ Flowers white or more or less bluish pink . . . . 33.

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* Note. In the genus Aethionema R.Br. two kinds of fruit may be produced on one plant, some dehiscent and many-seeded, others indehiscent and one-seeded.

25. Silicles more or less broad-winged along the margin . . . . 26.
+ Silicles wingless, boat-shaped or clavate . . . . 29.
26. Embryo notorrhizal . . . . 27.
+ Embryo pleurorhizal or notorrhizal; fruit broad-oval with broad wing whose ends appear truncated. Stigma sessile . . . . 601. Chartoloma Bge.
27. Perennials, leaves pinnate . . . . 668. Vinklera Rgl.
+ Annuals and biennials, leaves entire . . . . 28.
28. Silicles thickened at margin . . . . 29.
+ Silicles not as above . . . . 31.
29. Silicles minute, not longer than 5 mm . . . . . 602. Pachypterygium Bge.
+ Silicles larger . . . . 30.
30. Silicles rounded or oval, cordate, with broad coriaceous wing. Style with slender silicle at apex, filiform. . . . . 604. Sameraria Desv.
+ Silicles with slight notch above middle (panduriform) . . . . 600. Isatis L. sect. Eremoglaston Bge.
31. Pedicels in fruit clavate, silicles oval or cuneate, rarely dimorphous; lower silicles almost nut-shaped, upper flat, oval stigma sessile . . . . 600. Isatis L.
+ Pedicels in fruit uniformly thickened . . . . 32.
32. Silicles boat-shaped . . . . 603. Tauscheria Fisch.
+ Silicles clavate . . . . 599. Myagrum L.
33. Silicles with 2 or more seeds . . . . 34.
+ Silicles 1-seeded . . . . 38.
34. Fruit elongate, tetragonous, with two points, one above the other . . . . 654. Cakile Mill.
+ Fruit different . . . . 35.
35. Fruit reniform. . . . . 665. Coronopus Gaertn.
+ Fruit different . . . . 36.
36. Fruit rounded-oval or oboval, filaments edentate . . . . 37.
+ Fruit winged or wingless, elongate or rounded, filaments usually dentate. Dehiscent and indehiscent fruit may develop on one plant . . . . 673. Aethionema R. Br.

18

37. Fruit winged . . . . 666. Stubendorffia Schrenk.
+ Fruit wingless . . . . 663. Stroganovia Kar. et Kir.
38. Silicles with winged margin . . . . 39.
+ Silicles wingless . . . . 40.
39. Silicles broad-oval, with broad wing . . . . 687. Peltaria Jacq.
+ Silicles with narrow wing and long falcate beak . . . . 607. Spirorhynchus Kar. et Kir.
40. Silicles spheroid or subspheroid . . . . 41.
+ Silicles elongate, inflated at summit. . . . . 568. Sobolevskia M. B.
41. Silicles spheroid-ovate, unilocular . . . . 656. Calepina Adans.
+ Upper joint of silicle spheroid, with seed, lower joints inconspicuous, cylindrical, hollow . . . . 655. Crambe L.
42. Silicle with 2 terminal horns . . . . 684. Carpoceras Boiss.
+ Silicle hornless . . . . 43.
43. Silicles spheroid, netted-veined . . . . 44.
+ Silicles not spheroid . . . . 46.
44. Valves membranous, very delicate. . . . . 45.
+ Valves not membranous, more compact. Annuals, 10–20 cm high . . . . 674. Cochlearia L.

45. Carpels 2-seeded . . . . 679. Didymophysa Boiss.

+ Carpels 8-seeded . . . . 678. Coluteocarpus Boiss.

46. Silicles with circular wing . . . . 47.

+ Silicles wingless or wing confined to apex . . . . 49.

47. Carpels many-seeded, seeds with concentric ribs. . . . . 682. Thlaspi L.

+ Carpels 1–2-seeded, seeds without concentric ribs . . . . 48.

48. Carpels 2-seeded, septum stout. . . . . . . 681. Pachyphragma N. Busch.

+ Carpels 1-seeded . . . . 598. Graellsia Boiss.

49. Valves keeled, crested . . . . 50.

+ Valves keelless . . . . 54.

50. Seeds notorrhizal . . . . 51.

19 + Seeds pleurorhizal . . . . 52.

51. Carpels with 1–2 seeds . . . . 683. Eunomia DC.*

+ Carpels with several seeds . . . . 680. Dilophia Thoms.

52. Petals 1.5–3.5 mm long, outer petals enlarged in peripheral flowers of inflorescence. . . . . 685. Teesdalea R. Br.

+ Petals ca. 1 mm long, all petals equal . . . . 53.

53. Carpel 2-seeded . . . . 670. Hutchinsia R. Br.

+ Carpels many-seeded . . . . 671. Hymenolobus Nutt.

54. Leaves dissected into 3–5 linear lobes. . . 592. Pseudovesicaria Rupr.

+ Leaves different . . . . 55.

55. Silicles 40–50 mm long, flat, pendulous; large forest plant with lilac-scented flowers . . . . 634. Lunaria L.

+ Silicles much smaller . . . . 56.

56. Cauline leaves amplexicaul . . . . 57.

+ Cauline leaves petiolate. . . . . 59.

57. Petals yellow . . . . 688. Camelina Crantz (C. linicola)

+ Petals white . . . . 58.

58. Plants of cliffs in southern part of the Caucasian isthmus, 40–50 cm high . . . . ★677. Pseudosempervivum (Boiss.) Grossh.

+ Plants of the northern seacoasts, 10–20 cm high. . . . 674. Cochlearia L.

59. Petals ca. 2 mm long . . . . 60.

+ Petals ca. 4–6 mm long . . . . 61.

60. Aquatic plants, 4–6 cm high . . . . 691. Subularia L.

+ Plants of dry rocky sites, 45–80 cm high. . . . . 675. Pseudocamelina N. Busch.

61. Perennials of damp places, 50–100 cm high. . . . . 588. Armoracia G. M. Sch.

+ Plants 20–30 cm high . . . . 62.

62. Perennials of Tadzhikistan with radical leaves; leaves rounded, lobed . . . . 597. Physalidium Fenzl.

+ Biennials of Transcaucasia with leafy stems; leaves oblanceolate or oblong . . . . 676. Peltariopsis N. Busch.

63. Fruit a silicle . . . . 64.

+ Fruit a silique . . . . 76.

64. Silicles nut-shaped, with long falcate beak . . . . 607. Spirorhynchus Kar. et Kir.

+ Silicles different . . . . 65.

20 65. Flowers white or pink . . . . 66.

+ Flowers yellow . . . . 71.

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* See also 686. Heldreichia Boiss.

66. Silicles two-jointed, upper joint one-seeded, spheroid, hollow inconspicuous . . . . 655. Crambe L.
+ Silicles different . . . . 67.
67. 20—40 mm long, winged, flat, geminate. . . . . . . 667. **Megacarpaea** DC.
+ Silicles much smaller . . . . 68.
68. Silicles spheroid, membranous, hirsute. . . . 664. **Hymenophysa** C. A. M.
+ Silicles flattened, if inflated then glabrous . . . . 69.
69. Outer (pair of) petals larger than inner . . . . 672. Iberis L.
+ All petals equal, rarely missing . . . . 70.
70. Filaments edentate. Carpels one-, rarely 2-seeded; fruit dehiscent or indehiscent . . . . 662. Lepidium L.
+ Filaments nearly always dentate or winged, carpels 1—3-seeded, sometimes on same plant also 1-seeded indehiscent fruits . . . . 673. Aethionema R. Br.
71. Silicles boat-shaped . . . . 603. Tauscheria Fisch.
+ Silicles different . . . . 72.
72. Silicles 2-jointed, upper joint spheroid, lower cylindrical. . . . . 653. Rapistrum Desv.
+ Silicles unilocular or bilocular . . . . 73.
73. Silicles unilocular, 1-seeded . . . . 74.
+ Silicles many-seeded . . . . 75.
74. Plants with entire leaves . . . . 600. Isatis L.
+ Plants with pinnate leaves . . . . 668. Winklera Rgl.
75. Valves nerveless, embryo pleurorhizal . . . . 587. Roripa Scop.
+ Valves with midrib, embryo notorrhizal . . . . .583. **Redovskia** Cham. et Schlechtd.
76. Flowers pink or white; hairs simple . . . . 77.
+ Flowers yellow . . . . 84.
77. Plants with glandular hairs or papillae . . . . . 609. Clausia Korn.-Tr.
+ Plants with simple hairs only . . . . 78.
21 78. Silique filled with spongy tissue . . . 657. Rhaphanus L. (Rh. sativus L.)
+ Silique different . . . . 79.
79. Embryo pleurorhizal . . . . 80.
+ Embryo notorrhizal . . . . 82.
80. Valves with distinct midrib, twisted at dehiscence . . . . 564. Macropodium R. Br.
+ Valves without midrib, not twisted at dehiscence . . . . 81.
81. Silique broadly linear, placentae expanded, triangular . . . . 590. Dentaria L.
+ Silique narrowly linear, placentae narrow . . . . 591. Cardamine L.
82. Silique tetragonous . . . . 565. Alliaria Scop.
+ Silique flat . . . . 83.
83. Silique aseptate . . . . 572. Aphragmus Andrz.
+ Silique with septum, bilocular . . . . 610. Parrya R. Br.
84. Carpels with 2 rows of seeds . . . . 85.
+ Carpels with 1 row of seeds . . . . 87.
85. Embryo pleurorhizal, valves without midrib or midrib inconspicuous. . . . . 587. Roripa Scop.
+ Seeds with folded cotyledons, valves with very distinct midrib . . . . 86.
86. Siliques oblong, inflated, with ensiform beak, seeds 2—3 mm across . . . . 651. Eruca Adans.
+ Siliques linear, seeds small . . . . 648. Diplotaxis DC.

87. Siliques indehiscent, jointed, disarticulating when ripe . . . . 657. Rhaphanus L.
+ Siliques with normal dehiscence . . . . 88.
88. Embryo with folded cotyledons . . . . 89.
+ Embryo pleurorhizal or notorrhizal . . . . 91.
89. Seeds spheroid . . . . 90.
+ Seeds oblong . . . . 652. Hirschfeldia Moench.
90. Silique with flattened, 2-edged beak, valves with 3–5 nearly equal nerves . . . . 650. Sinapis L.
+ Silique with cylindrical beak; valves with 1 midrib and 2 delicate, tortuous, lateral nerves . . . . 649. Brassica L.
91. Embryo notorrhizal . . . . 93.
22 + Embryo pleurorhizal . . . . 92.
92. Leaves lyre-shaped . . . . 586. Barbarea R. Br.
+ Leaves obovate, fleshy, entire . . . . 630. Christolea Camb.
93. Valves with delicate, inconspicuous midrib. Siliques torulose . . . . 578. Cymatocarpus Schulz.
+ Siliques not torulose, valves with conspicuous midrib . . . . 569. Sisymbrium L.
94. Fruit a silicle . . . . 95.
+ Fruit a silique . . . . 125.
95. Silicles indehiscent . . . . 96.
+ Silicles dehiscent . . . . 107.
96. Silicle tomentose with dense white hairs. . . . . . 633. Lachnoloma Bge.
+ Silicle different . . . . 97.
97. Silicle produced into horns . . . . 98.
+ Silicle hornless . . . . 99.
98. Petals white. Silicle cubical-spheroid . . . . 629. Octoceras Bge.
+ Petals yellow. Silicle elongate. . . . . 617. Tetracmidion Korsh.
99. Silicle flattened . . . . 643. Clypeola L.
+ Silicle inflated, spheroid to ovate . . . . 100.
100. Embryo with spiral convolute cotyledons. Silicle ovate, 2-jointed. . . . . 605. Bunias L.
+ Embryo notorrhizal, silicle 2-celled . . . . 101.
101. Silicles densely covered with fine hairs. Petals white . . . . 102.
+ Silicles glabrous . . . . 103.
102. Silicles with very thick valves, 2-seeded. . . . . . 627. Euclidium R. Br.
+ Silicles with delicate, membranous valves, 4-seeded . . . . 649. Physoptychis Boiss.
103. Silicles unilocular, 1-seeded. Petals yellow . . . . . . 689. Neslia Desv.
23 + Silicles bilocular, 2-seeded. Petals white . . . 628. Litvinovia Woron.
104. Flowers yellow . . . . 105.
+ Flowers white or pink to purple . . . . 114.
105. Seeds winged . . . . 106.
+ Seeds wingless. . . . . 109.
106. Carpels 1–2-seeded . . . . 637. Alyssum L.
+ Carpels with 4 or more seeds . . . . 107.
107. Annuals; silicles small, ca. 6 mm long and ca. 3 mm broad . . . . 638. Meniocus DC.
+ Perennials; silicles larger . . . . 108.

108. Valves papyraceous, strongly inflated . . . . 640. Vesicaria Adans.
+ Valves thick, nearly flat . . . . 635. Fibigia Medic.
109. Embryo pleurorhizal . . . . 110.
+ Embryo notorrhizal . . . . 111.
110. Valves without midrib . . . . 646. Draba L.
+ Valves with prominent midrib . . . . 571. Alyssopsis Boiss.
111. Silicle obpyriform or triangular . . . . 112.
+ Silicle oval . . . . 113.
112. Silicle obpyriform. Seeds 1.5–2.5 mm long . . . 688. Camelina Crantz.
+ Silicles triangular, flattened. Seeds ca. 0.75–1 mm long . . . . 690. Capsella Medic.
113. Seeds biseriate . . . . 580. Chrysochamela Boiss.
+ Seeds uniseriate . . . . 581. Sophiopsis Schulz.
114. Embryo notorrhizal . . . . 115.
+ Embryo pleurorhizal . . . . 118.
115. Silicles dorsoventrally flattened, triangular . . . . 690. Capsella Medic. (C. orientalis Klok.).
+ Silicle inflated or laterally flattened . . . . 116.
116. Silicle pyriform. Seeds large (1.5–2.5 mm long) . . . . 688. Camelina Crantz. (C. albiflora Kotschy).
+ Silicle elongate, ellipsoidal or ovate . . . . 117.
117. Silicle inflated, seeds small . . . . 575. Braya St. et Hoppe (see also Sophiopsis Schulz).
+ Silicles flattened . . . . 669. Hedinia Ostenf.
118. Carpels 1–2-seeded . . . . 119.
24 + Carpels many-seeded . . . . 121.
119. Carpels 2-seeded . . . . 639. Ptilotrichum C. A. M.
+ Carpels 1-seeded . . . . 120.
120. Annuals; seeds winged . . . . 644. Buchingera Boiss.
+ Perennials; seeds wingless . . . . 642. Koniga Adans.
121. Seeds winged . . . . 122.
+ Seeds wingless . . . . 123.
122. Petals entire . . . . 635. Fibigia Medic.
+ Petals bipartite . . . . 636. Berteroa DC.
123. All filaments without appendages or teeth . . . . 124.
+ Filaments of longer stamens winged, with proximal teeth . . . . 645. Schiverekia Andrz.
124. Petals entire . . . . 646. Draba DC.
+ Petals bipartite . . . . 647. Erophila DC.
125. Siliques indehiscent or slightly dehiscent . . . . 126.
+ Siliques dehiscent . . . . 132.
126. Siliques of two kinds: upper dehiscent, lower indehiscent . . . . 621. Diptychocarpus Trautv.
+ All siliques of one kind . . . . 127.
127. Siliques disarticulating transversally into individual joints . . . . . 128.
+ Siliques not as above . . . . 129.
128. Carpels with seeds in 2 rows. Embryo pleurorhizal. Flowers yellow or pink . . . . 622. Chorispora R. Br.
+ Carpels with seeds in single row. Embryo notorrhizal. Flowers white . . . . 613. Cryptospora Kar. et Kir.
129. Flowers in axils of leaves . . . . 618. Leptaleum DC.
+ Flowers arranged in racemes . . . . 130.

130. Siliques linear, somewhat constricted between seeds, truncated, terminating with style . . . . 623. **Sterigmostemum** MB.
+ Siliques tapering toward style, not constricted between seeds . . . 131.
131. Glandular hairs. . . . . 625. **Anchonium** DC.
+ No glandular hairs . . . . 626. **Trichochiton** Kom.
132. Hairs branched and glandular or with conical papillae. . . . . 133.
+ Hairs branched . . . . 138.
25 133. Embryo notorrhizal . . . . 134.
+ Embryo pleurorhizal . . . . 135.
134. Siliques cylindrical, constricted between seeds . . . . 574. **Torularia** Schulz.
+ Siliques linear, not constricted between seeds . . . . . 608. **Hesperis** L.
135. Petals 3–7 mm long . . . . 620. **Dontostemon** Andrz.
+ Petals 12–25 mm long . . . . 136.
136. Siliques protruding, very long (5–15 cm) . . . . . . 614. **Matthiola** R. Br.
+ Siliques shorter . . . . 137.
137. Siliques pendant . . . . 615. **Microstigma** Trautv.
+ Siliques protruding . . . . 624. **Iskandera** N. Busch.
138. Embryo notorrhizal . . . . 139.
+ Embryo pleurorhizal. . . . . 155.
139. Silique with 4 apical horns . . . . 616. **Tetracme** Bge.
+ Siliques without horns . . . . 140.
140. Flowers yellow . . . . 141.
+ Flowers white or more or less pink . . . . 146.
141. Carpels with seeds in 2 rows . . . . 585. **Syrenia** Andrz.
+ Carpels with seeds in 1 row . . . . 142.
142. Siliques short, oblong-oval, broad . . . . 582. **Smelovskia** C. A. M.
+ Siliques long, linear or slender-cylindrical . . . . 143.
143. Siliques with more or less clearly visible membranous partitions between seeds. Hairs furcate, remote . . . . 574. **Torularia** Schulz.
+ Siliques linear, more or less faceted, with closely appressed hairs, bipartite to multipartite . . . . 144.
144. Hairs bipartite, appressed, leaves entire. . . . . 584. **Erysimum** L.
+ Hairs stellate. Leaves twice pinnatipartite . . . . 145.
145. Siliques linear, slender . . . . 579. **Descurainia** Webb et Berth.
+ Siliques oval or oblong, broadened in the middle . . . . 581. **Sophiopsis** Schulz.
146. Siliques short, oblong-ovate, inflated . . . . 147.
26 \+ Siliques long, linear-cylindrical . . . . 148.
147. Leaves entire, more or less dentate . . . . . . 575. **Braya** St. et Hoppe.
+ Leaves pinnatisect . . . . .579. **Sophiopsis** Schulz (see also Smelovskia C. A. M.).
148. Carpels with seeds in 2 rows . . . . 610. **Parrya** R. Br.
+ Carpels with seeds in 1 row . . . . 149.
149. Cauline leaves sessile, often sagittate, rarely lacking and then only radical leaves present . . . . 150.
+ Cauline leaves petiolate . . . . 151.
150. Flowers pink-purple . . . . 612. **Malcolmia** (L.) R. Br. (M. grandiflora (Bge.) O. Kntze.).
+ Flowers white . . . . 577. **Arabidopsis** Heynh.
151. Siliques tuberculate, more or less moniliform or slightly contorted. . . . . 152.

+ Siliques smooth and erect . . . . 154.
152. Siliques contorted, flowers white . . . . 619. **Streptoloma** Bge.
+ Siliques tuberculate, cylindrical, flowers pink or white . . . . 153.
153. Inner sepals saccate at base . . . . 573. **Maresia** Pomel.
+ All sepals equal, inner sepals not saccate at base . . . . 574. **Torularia** Schulz.
154. Hairs appressed, bipartite . . . . 584. **Erysimum** L.
+ Hairs furcate, spreading . . . . 612. Malcolmia (L.) R. Br.
155. Siliques broad, rounded or suboval . . . . 156.
+ Siliques narrow, linear, often more or less tetragonous . . . . 157.
156. Perennials or undershrubs . . . . 631. **Farsetia** Turra.
+ Annuals . . . . 632. **Cithareloma** Bge.
157. Carpels with seeds in 2 rows . . . . 593. **Turritis** L.
+ Carpels with seeds in 1 row . . . . 158.
158. Flowers white or pink . . . . 159.
+ Flowers yellow . . . . 162.
159. Flowers white . . . . 160.
+ Flowers pink . . . . 161.
160. Shorter stamens with oblong, nectariferous glands; median glands lacking . . . . 610. Atelanthera Hook. et Thoms. 27
+ Shorter stamens with annular nectariferous glands; median glands bilobate . . . . 594. Arabis L.
161. Valves without midrib, siliques undulate-tuberculate from concavity above seeds. Grayish tomentose perennials with densely leafy stems . . . . 595. Stevenia Adams et Fisch.
+ Siliques and stems different . . . . 162.
162. Plants not forming cushions. Petals, if yellowish, then light . . . . 594. **Arabis** L.
+ Cushion-forming plants; petals bright yellow. Transbaikalia . . . . 596 Borodinia N. Busch.

Genus 564. **MACROPODIUM** * R. BR.**

R.Br. in Aiton Hort.Kew.ed.2, VI (1812) 108.

Sepals erect, not saccate. Petals linear-spatulate, white, faintly clawed. Longer stamens exserted from corolla, without nectariferous glands; the free strongly developed nectariferous glands form half-rings at base of shorter stamens, with club-shaped appendages directed toward the longer stamens, which partially envelop them. Fruit a broad flattened silique; flat valves with midrib and a system of veins; stigma sessile, minute, slightly bilobate Pedicel at times up to 12 mm and longer, pendulous, rarely horizontal or ascending. Septum of small, narrow, very thin-walled cells, with straight walls; cells predominantly longitudinal in the median region, becoming variously oriented toward the margins. Seeds lenticular, uniseriate. Embryo pleurorhizal. — Perennials, with entire leaves.

Two species common to the mountain areas of southern Siberia and the Far East.

One of the oldest genera of the family Cruciferae.

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* From macros — large and podos — leg.

** Treatment by N.A.Bush.

1. Leaves elliptic, oblong to lanceolate, pedicel 3–6 mm, with very narrow margin . . . . 1. **M. nivale** (Pall.) R. Br.

+ Lower leaves rounded-oval, upper oval-elliptic, pedicel 1–2 cm, seeds broad-winged . . . . 2. **M. pterospermum** F. Schmidt.

28 1. **M. nivale** (Pall.) R. Br. in Ait. Hort. Kew. Ed. 2, IV (1812) 108; Ldb., Fl. Ross. I, 132; N. Busch, Fl. Sib. et Or. Extr. IV, 485; Kryl., Fl. Zap. Sib. VI, 1353. — Cardamine nivalis Pall., Reise II (1773) Anh. No. 113. — Ic.: Pall., ibid., tab. U; N. Busch, l. c., 486 et tab. geogr. 488.

Perennial; rootstock creeping, long, stout, branching; stem simple, glabrous or slightly pubescent, 20–63 cm high; leaves elliptic, oblong to lanceolate, glabrous or very slightly pubescent, radical or lower cauline leaves petiolate, small, obtuse-serrate, upper subsessile, entire. Raceme long, dense, with horizontally spreading flowers; pedicels robust, very short, less than 1 mm at flowering, up to 1.5 mm in fruit; sepals 5.5–6 mm long; petals white, 8–10 mm long, stamens with twisted anthers; pedicel to 6 mm in fruit; siliques 18–47 mm long, 3–5 mm broad, glabrous, spreading below; seeds grayish brown, rounded or elliptic, 3–3.25 mm long, 2–3 mm broad, with very narrow edge. June–July.

Moist places near mountain streams, melting snows, moist rocky areas, and gravels of high-mountain ranges. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau. **Gen. distr.**: Mongolia. Described from the highest mountains of Altai near perennial snow. Type in London.

2. **M. pterospermum** Fr. Schmidt, Sachalin (1868) 113; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 488. — Ic.: Fr. Schmidt, ibid., tab. 11; N. Busch, l. c., 489 et tab. geogr. 488.

Perennial; rootstock creeping, stout; stem simple, erect, cylindrical, slightly pubescent at tip; leaves sparsely arranged, serrate, the lower long-petiolate, rounded-oval, with rounded or even cordate bases, upper leaves oval or elliptic, acuminate, tapering into a short winged petiole at base. Raceme elongating, in fruit pedicels horizontal, 8–12 mm, siliques 2–4 cm long; pedicel 15–20 mm long, horizontal, 3.5 mm broad; seeds rounded or only very slightly elongate, girdled with a broad pale wing giving them a more elongate form. Fr. August–September.

Well-watered slopes. — Far East: Uss. (Khor, tributary of Ussuri, Chuken River, coniform hills of Duntimauoni, timberline). Sakh. Described from Sakhalin (top of Ichara Mountain, slopes of Nuburino Mountain, to the north of Manue). Type in Leningrad.

Note. Relic of Early Tertiary flora.

31 Genus 565. **ALLIARIA** * (MARSH. ex RUPP.) DC.**

Marsh. ex Rupp., Fl. Jen. ed. 3 (1745) 75; DC., Syst. II (1821) 488.

Sepals erect. Petals clawed, white. Silique cylindrical, with short conical style. Valves 3-nerved, the middle stouter than the others. Septum hyaline, epidermal cells elongate, with undulating walls. Seeds oblong, longitudinally striate, arranged in one row.

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* From Allium — leek, garlic, since the pulverized leaves have the odor of garlic.

** Treatment by N.A.Bush.

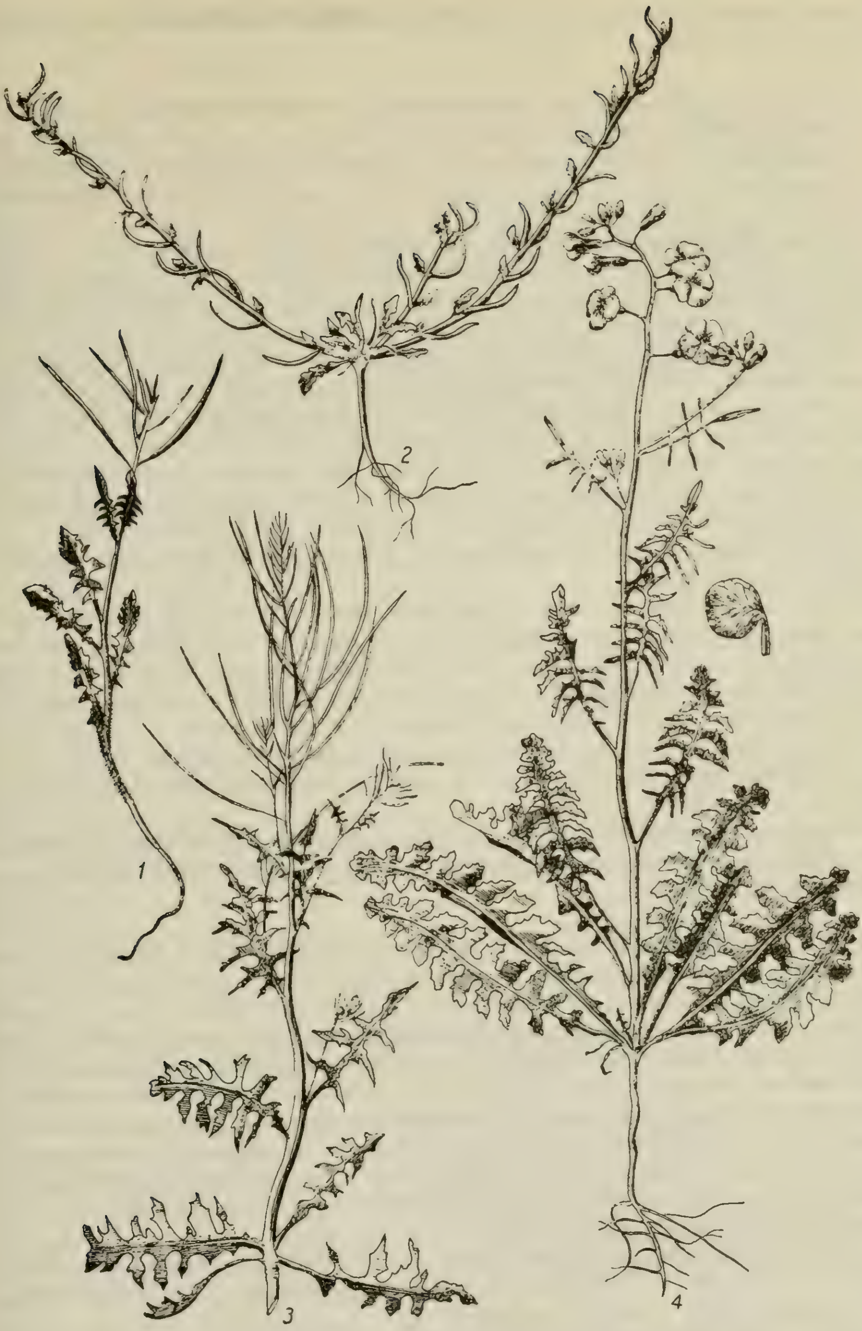

PLATE II. 1 — Sisymbrium orientale L.; 2 — S.runcinatum Lag.; 3 — S.irio L.; 4 — S.bilobum (C.Koch) Grossh.

Two species common to Europe, the Caucasus, and Central Asia. An Early Tertiary genus.

1. Siliques 30–80 mm long, many-seeded. Bracts sometimes present, but only in lower flowers . . . . 1. A. officinalis Andrz.
+ Siliques 6–18 mm long, carpels 1–2-seeded. Bracts present in all flowers . . . . 2. A. brachycarpa M. B.

1. **A. officinalis** Andrz. ex M. B., Fl. taur.-cauc. III (1819) 445; N. Busch in Fl. cauc. crit. III, 4 (1908) 181. – Erysimum Alliaria L., Sp. pl. (1753) 660. – Sisymbrium Alliaria Scop., Fl. Carniol. II (1772) 26; Ldb., Fl. Ross. I, 182, 760; Shmal'g., Fl. I, 68.

Biennials; stem 12–100 cm high, erect, pubescent only in lower part; leaves radical, reniform, strongly emarginate-crenate, the upper cordate-oval, sharp-toothed. Racemes bractless or with bracts only in lower flowers (var. bracteata Rupr.), sepals 2.5–4 mm long; petals 6–8 mm long; pedicels thickened in fruit, 3–15 mm long; siliques glabrous, rarely pubescent (var. trichocarpa N. Busch), 2–8 cm long, 2–2.3 mm broad, ascending; style 1–3 mm long (in var. longistyla N. Busch style 4–4.5 mm long); seeds 3–4 mm long, ca. 1.5 mm broad, striae not anastomosing. April–August.

Woods and between shrubs. – European part: all regions except Arc. Eur., Kar.-Lap., Dv.-Pech., and L. V.; Caucasus: Cisc., Dag., W., E., and S. Transc.; Centr. Asia: T. Sh., Pam.-Al., Mtn. Turkm. **Gen. distr.**: nearly all Europe (except for Arctic), the western Himalayas, introduced into North America. Described from Europe. Type in London.

Note. Early Tertiary forest weed of the same ecological and geographical type as Pachyphragma macrophyllum, Urtica dioica, and others.

Economic importance. In the Caucasus used as a substitute for garlic. The ground seeds are used as mustard plasters. Seeds used for the extraction of fatty oil.

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2. **A. brachycarpa** M. B., Fl. taur.-cauc. III (1819) 445; N. Busch in Fl. cauc. crit. III, 4, 185. – Taphrospermum brachycarpum Ldb., Fl. Ross. I (1842) 194. – T. caucasicum Rupr., Fl. Cauc. (1869) 84.

Biennials; soft and squarrosely downy plant, rarely subglabrous; stem 25–50 cm high, branching from base, branches ascending or decumbent; lower leaves long-petiolate, rounded-oval, crenate-dentate, often cordate, the upper leaves oblong, small. Racemes bracteate, elongating in fruit; sepals up to 2.5 mm long; petals ca. 5 mm long; siliques scabrous, rarely subglabrous, 9–30 mm long, 1.5–3 mm broad, erect, oblong or short-linear, acuminate toward summit, style 2.5–6 mm long; seeds with slender, anastomosing striae. June–August.

Taluses in the high-mountain zone; 2,000–3,000 m, rarely lower than 1,500 m. – Caucasus: Ciscaucasia, Greater Caucasus. Described from the Georgian SSR. Type in Leningrad.

Note. This species presumably dates from the formation of the early high-mountain flora of the Caucasus.

Genus 566. **TAPHROSPERMUM** * C. A. M.**

C.A.M. in Ldb., Fl. Alt. III (1831) 172.

Sepals ascending, the outer broadly oblong, the inner oval, slightly saccate at base, rounded at apex, with membranous margins. Petals straw-colored, obovate, slightly emarginate at top, short-clawed. Filaments rather broad. Nectariferous glands connate, the lateral ring-shaped and the median tuberculate. Ovary 6–8-ovuled. Stigma small, flattened. Silicle short, terete-subulate-tetragonous. Valves slender, membranous, hyaline, almost keeled, with large midrib and a net of small veins. Septum cells oblong, polygonal, with straight walls. Seeds 2–4 in each cell, uniseriate, with alveolate or sulcate surface. Cotyledons flat. Embryo notorrhizal, sometimes pleurorhizal. — Perennials, small and branching, with oval petiolate leaves and racemose inflorescence.

Two species in the alpine zone of Altai, Mongolian, and Central Asian Alps.

1. Raceme with bracts. Petals 2.5–3 mm long. Silicle 5–10 mm long . . . . 1. **T. altaicum** C. A. M.

+ Raceme with bracts only at lower flowers. Petals 4 mm long. Silicle 8–12 mm long. . . . . 2. **T. platypetalum** Schrenk.

33 1. **T. altaicum** C. A. M. in Ldb., Fl. Alt. III (1831) 172; N. Busch, Fl. Sib. et Or. Extr. I (1913) 125; Schulz in Pflzr. IV, 105 (1924) 27; Kryl., Fl. Zap. Sib. VI, 1275. — Ic. Ldb., Ic. pl. Fl. Ross. IV (1833) tab. 320; N. Busch, l. c., 126 et tab. geogr. 127.

Perennial, glabrous, profusely branched; stems 1.5–4–17 cm long, prostrate to suberect; leaves 6–15 mm long, all petioled, elliptic or oval, obtuse at apex, entire, rarely with 1–2 indistinct teeth. Flowers sessile at axils of basal and upper leaves; sepals 1.25–1.5 mm long; petals 2.5 mm long, oblong, tapering into a short claw, rounded at top; silicles 6–10 mm long, 1.5–2 mm broad at base, with short bristles or smooth at surface, the upper erect, lower nearly pendulous; fruiting pedicels 4–7 mm long, usually curved to one side. Fl. July, Fr. August.

Stony and gravelly lichen alpine tundra, rocky taluses, and around glaciers. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. Endemic. Described from the alpine areas along Chuya River near the mouth of the Chegan River. Type in Leningrad.

2. **T. platypetalum** Schrenk in Fisch. et Mey. Enum. pl. nov. II (1842) 60; N. Busch, Fl. Sib. et Or. Extr. I, 125; Schulz in Pflzr. IV, 105, 28.

Perennial generally similar to the preceding, differing as follows: all leaves oval or elliptic, entire. Raceme longer in flowering; pedicels 4–9 mm long, only the very lowest bracteate; sepals reticulate-rugose on outer surface, not smooth; petals 4 mm long; silicles longer, 8–12 mm long; seeds indistinctly pitted. June-July.

Stony slopes. — Centr. Asia: Dzu.-Tarb. Endemic. Described from Dzungarian Ala Tau, Mt. Dzhabyk. Type in Leningrad.

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* From the Greek tafros — ditch and sperma — seed.

** Treatment by N.A.Bush.

Genus 567. **EUTREMA** * R. BR.**

R.Br.In Parry I Voy.(1842) App. tab. A, p. 267.

Sepals erect, not saccate. Petals white. Filaments edenticulate. Two cylindrical nectariferous glands embracing the short stamen at both sides, the pairs are adjacent to each other and with an appendage toward the narrow median gland or often connate with it. Ovary sessile, style nearly absent, stigma obtuse. Siliques oblong, slightly tapering toward base, valves keeled, with distinct midrib. Septum perforated in different places, slender, epidermal cells oblong-tetragonal or polygonal with straight slender walls. 34 Seeds uniseriate, on adnate funicle, ovate. Cotyledons flat, embryo notorrhizal. Low glabrous perennials with entire leaves.

Arctic-Alpine Eurasian genus of four species.

1. Leaves broad, the lower deeply cordate. High, strongly branched plants (40–80 cm or even higher) . . . . 2.
+ Leaves entire, oblong; only the radical leaves ovate, frequently with cordate base. Stems simple or partly branched . . . . 3.
2. Leaves largely crenate; siliques short, 7–9 mm long . . . . 3. E. cordifolium Turcz.
+ Leaves indistinctly crenate, siliques ca. 20 mm or longer . . . . 4. E. pseudocordifolium M. Pop.
3. Relatively tall plant (40–72 cm high). Cauline leaves oblong-ovate. Petals 4–4.5 mm long. Septum always perfect . . . . 2. E. integrifolium (DC.) Bge.
+ Stems 5–42 cm long. Cauline leaves oblong or lanceolate. Petals 3.5 mm long. Septum very often imperfect. . . . . . . 1. E. edwardsi R. Br.

1. **E. edwardsi** R. Br. in Parry, I Voy. (1824) App. 9; Ldb., Fl. Ross. I, 197, 764; Turcz. Fl. baic. -dahur. I, 164; N. Busch, Fl. Sib. et Or. Extr. I, 128; Kpyl., Fl. Zap. Sib. VI, 1276. — E. parviflorum Trucz., Cat. (1838), No. 170; Fl. baic. - dah. I (1842) 283. — Ic.: Parry, l. c., tab. A; Ldb., Ic. Fl. Ross. III (1831), tab. 258; N. Busch, l. c., 130 et tab. geogr. 131.

Perennial, very stout; stems rather erect, 5–42 cm high; all leaves entire, the radical long-petioled, ovate to ovate-elliptic, blade 1–2 cm long; cauline leaves oblong or lanceolate, the lower short-petioled, the upper tapering at base, subsessile. Raceme elongate post anthesis; petals white, obovate, short-clawed, ca. 3.5 mm long, sometimes 2.25 mm long (var. parviflorum (Turcz.) N. Busch), 1.5 times longer than the orbicular convex sepals; fruiting pedicels 2–6.5 mm long; silicles elliptic to linear-oblong, tapering at both ends, erect, 7–19 mm long, 1.5–3 mm broad; septum more or less imperfect, sometimes perfect (var. septigerum (Bge.) N. Busch); seeds brown, 4–8 in silicle, 2–2.5 mm long, 1–1.5 mm broad. June–August.

On gravels near streams and rivers, moraines and damp meadows of the Arctic or alpine mountain zones. — Arctic: Arc. Eur., Arc. Sib., Chuk., An.; W. Siberia: Ob., Alt.; E. Siberia: Ang.-Say., Lena-Kol.; Far East: Kamch.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Arc., Mong. Described from Arctic America. Type in London.

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* From Greek eu — good and trema — orifice.

** Treatment by N.A.Bush.

35 2. **E. integrifolium** (DC.) Bge., Del. sem. h. Dorp. (1839) 8 in textu; Turcz., Fl. baic.-dahur. I, 164; N. Busch in Fl. Sib. et Or. Extr. I, 132; Kpyl., Fl. Zap. Sib. VI, 1277: — Cochlearia integrifolia DC., Syst. II (1821) 369. — E. alpestre Ldb., Fl. Ross. I (1842) 198, 764. — Ic.: Ldb., Ic. pl. Fl. Ross. III (1831) tab. 283; N. Busch, l. c., 132 et tab. geogr. 133.

Perennial with stout roots; stems erect, to 60—72 cm high, usually branching above; leaves entire, radical leaves long-petiolate (petioles up to 10 cm long), ovate-cordate, obtuse, blade 4—7 cm long; cauline leaves ovate to oblong-ovate acuminate, the lower short-petiolate, the upper subsessile. Sepals broad-elliptic, 2—2.5 mm long; petals 4—5.5 mm long, oboval, short-clawed; pedicels slender, 8—21 mm long in fruit; silicles ascending, oblong, tapering at both ends, 7—13 mm long, ca. 1.5—2 mm broad; septum perfect; seeds biseriate. Fl. April—June, Fr. May—July.

Woods and subalpine zone. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. Endemic. Described from Altai (Krestovaya, Kazinskie Alps). Type in Leningrad.

3. **E. cordifolium** Turcz., Cat. (1838), No. 172; Fl. baic.-dahur. I (1842) 165; Ldb., Fl. Ross. I (1842) 198; N. Busch, Fl. Sib. et Or. Extr. I, 134. — Ic.: N. Busch, l. c., 134 et tab. geogr. 133.

Perennial with stout roots; stems branching, 40—60 cm high; all leaves crenate-serrate, petiolate; radical leaves up to 12—13 cm long and 9—10 cm wide, radical and lower cauline leaves broad-cordate, middle leaves broad-ovate, cuneate, the uppermost subrhombic; teeth differing in size, rounded or acute. Racemes elongating at summit or in axils, branching, many-flowered; sepals 2 mm long; petals 5.5—6 mm long; fruiting pedicels 8—13 mm long; silicles obovoid-oblong, tapering gradually toward base and abruptly toward apex, 7—9 mm long, up to 3 mm broad; seeds biseriate, 2.5 mm long, 1.25—1.5 mm broad.

Forests and meadows of mountain-forest. — E. Siberia: Ang.-Say. Endemic. Described from the eastern Sayans, Tunkin area, and meadows of mountain-forest near the Zhemchug River. Type in Leningrad.

4. **E. pseudocordifolium** M. Pop. in Addenda VII, p. 471.

Perennial; rhizome robust, short, with long stout roots, covered at summit with fibrous remnants of dead petioles; stems 50—80 cm high, branching above, branches spreading, long; radical leaves deeply cordate (10 × 10 cm),
36 obtuse, obscurely crenate at margin, with petioles longer than blade; lower cauline leaves 1—3, resembling radical leaves, cordate, with shorter petioles; the uppermost 1—2, much smaller, ovate, tapering at base. Racemes at flowering corymbiform, later elongating, loose; pedicels thin, patent, up to 20 mm long; sepals oblong, ca. 3 mm long; petals twice as long as sepals, oboval, white; siliques erect, thin-fusiform, glabrous, 3—4-seeded; style short, cylindrical; stigma truncate, entire. May.

Granite rocks. — Centr. Asia: T. Sh. Endemic. Described from eastern Tien Shan, the mountains of Trans-Ili Ala-Tau, and from Talgar Gorge. Type in Tashkent.

Note. Distinctly differs from E. integrifolium by its large typically cordate leaves, flowers twice as large, siliques twice as long; from E. cordifolium (Sayans) by its long siliques, leaves obscurely crenate and flowers somewhat larger.

Genus 568. **SOBOLEVSKIA** [*] M. B.[**]

M.B., Cent.pl.rar.Ross.merid.II(1810) tab.19; Fl.taur.-cauc.III (1819) 421; N. Busch, Revis.Sobol.(1905) cum tabula; in Fl.cauc.crit.III, 4 (1908) 186.

Sepals nearly spreading, not saccate at base. Petals oboval, white, short-clawed. Stamens free, slightly broadened at base. Silique indehiscent, oblong or clavate, coriaceous, unilocular, usually 1-, rarely 2-seeded. Stigma subsessile, simple, tiny. Annual and biennial plants, with rounded, large, crenate leaves.

Four species, common to the Crimea, Caucasus, and Near Asia.

1. Fruit curved, clavate-thickened at top, 7–9 mm long. Fruiting pedicel recurved. . . . . 4. **S. clavata** (Boiss.) Fenzl.
+ Fruit not curved, not clavate-thickened. Pedicels divergent or spreading but not recurved . . . . 3.
2. Fruit short, 4–4.5 mm long, abruptly truncate at base, with prominent nerves. Plant covered with very short bristles . . . . 3. **S. truncata** N. Busch.
+ Fruit pyriform, tapering at base, much larger . . . . 3.
3. Fruit nearly smooth, obscurely nerved, 9–10 mm long. Plant glabrous . . . . 1. **S. lithophila** M. B.
+ Fruit with distinctly prominent nerves, 6–8 mm long. Plant with very short bristles . . . . 2. **S. caucasica** N. Busch.

37 Section 1. **LITHOPHILAE** N. Busch Revis. Sobol. (1905) 71. – Silicles straight, not clavate.

1. **S. lithophila** M.B., l.c. (part., quoad pl. taur.); Ldb., Fl. Ross. I, 213 part., quoad pl. taur.; Shmal'g., Fl.I,105, quoad pl. taur.; N. Busch in Fl. cauc. crit. III, 4 (1908) 188. – Crambe macrocarpa M.B., Fl. taur.-cauc. II (1808) 90. – Ic.: N. Busch, Sobol. tab.

Annual; glabrous stem usually branched throughout, 20–40 cm high; leaves deeply notched-crenate, the radical and lower cauline long-petioled, rounded, usually somewhat cordate, cauline leaves cuneate, upper cauline leaves ovate-oblong, short-petioled. Sepals ca. 2 mm long; petals obovate, tapering into a short white claw 4 mm long; fruiting pedicel thickened at top, curved; fruit oblong, tapering toward base, curved above, obtuse, 6 mm long. March–May.

Stony places and cliffs. – European part: Crimea. Endemic. Described from the Crimea, at source of the Salgir River and on cliffs near Alupka. Type in Leningrad.

2. **S. caucasica** N. Busch, Revis. Sobol. (1905) 71; in Fl. cauc. crit. III, 4 (1908) 190. – Ic.: N. Busch, Sobol. tab.

Annual or biennial, verrucose-pilose at upper part, 40–70 cm high. Sepals ca. 2 mm long; petals ca. 4.5 mm long; silicles pyriform, tapering at base, 6–8 mm long, with 2 longitudinal nerves on septum, and with dorsal nerves, prominently reticulate or slightly branching, generally 1-seeded, oblong-linear, flattened; stigma tiny; embryo obliquely notorrhizal. June – July.

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[*] Genus named after the St.Petersburg botanist, Professor G.Sobolevskii.

[**] Treatment by N.A.Bush.

Taluses, rock cliffs, gravels. 950–2,000 m. Caucasus: Greater Caucasus, Dag. Endemic. Described from the central and eastern parts of the Greater Caucasus. Type in Leningrad.

3. **S. truncata** N. Busch, Revis. Sobol. (1905) 70, 72; in Fl. cauc. crit. III, 4 (1908) 192. – Ic.: N. Busch, Sobol. tab.

Biennial, verrucose-pilose at upper part. Sepals ca. 2 mm long; petals ca. 4.5 mm long; pedicels thin; silicles short, 4 – 4.5 mm long, truncate, netted-veined, prominently nerved; 1-seeded, short-cylindrical, stoutish, not flattened; stigma tiny; embryo obliquely notorrhizal. June–July.

Stony and clayey places. – Caucasus: Dag. Endemic. Described from Andi (Khupro-Shauri) and from Samur Dagestan (Buga-Dag Mountain pass). Type in Leningrad.

Section 2. **CLAVATAE** N. Busch, Revis. Sobol. (1905) 70, 72; in Fl. cauc. crit. III, 4 (1908) 192. – Silicles curved, clavate-thickened at summit.

38 4. **S. clavata** (Boiss.) Fenzl in Tchihatch. Asie Min., Bot. I (1860) 348; N. Busch in Fl. cauc. crit. III, 4 (1908) 192. – Parlatoria clavata Boiss. in Ann. Sc. Nat. (1842) 73, – Ic.: N. Busch Revis. Sobol., tab.

Annual, glabrous or beset with minute warts; stem ca. 40–50 cm high. Sepals ca. 2 mm long; petals ca. 3–4 mm long; fruiting pedicel 8–13 mm long; silicles glabrous or subglabrous, 6–10 mm long; seeds 1, rarely 2, oblong-cylindrical; embryo perfectly notorrhizal. May.

Gravels, taluses, and cliffs. – Caucasus: S. Transc. **Gen. distr.**: Asia Minor, Arm.-Kurd. Described from Asia Minor. Type in Geneva.

Genus 569. **SISYMBRIUM** * L.**

L. Sp.pl.(1753) 657, DC., Syst.II (1821) 548; O.E.Schulz in Engler's Pflanzenr.IV, 105 (1924) 46.

Sepals erect or divergent, not saccate. Petals clawed, oblong-obovate, yellow. Filaments broaden toward base, edenticulate. Lateral nectariferous glands forming a ring around the shorter stamens, median glands outside the longer stamens cylindrical, united with the lateral into a ring. Ovary sessile, stigma obtuse or slightly bilobate. Siliques linear, subcylindrical, valves convex, 3-nerved with the midrib most conspicuous. Seeds oblong or short-elliptic, more or less angular, embryo notorrhizal. – Annuals or perennials, with lyrate pinnatipartite or pinnatifid leaves (rarely entire), glabrous or covered with simple hairs.

Note. 1. Sisymbrium is an old Linnaean genus which has been, and still is undergoing systematic division. The genus is given here as treated by Shul'ts (Schulz) in Engler's "Pflanzenreich" (1924), yet I find it necessary to reexamine the relationship to the genus S. of such species as S. strictissimum L., S. elatum C. Koch and S. Luteum (Maxim) O. E. Schulz (section Norta Adans.), S. subspinescens (F. et M.) Bge., which Schulz refers to section Irio DC. and also S. subtilissimum M. Pop., which has bluish flowers and is hairless.

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* Names of different plants from Dioscorides and Pliny.

** Treatment by I.T.Vasil'chenko.

In my opinion the basis for such a reexamination, with regard to the first three species, is the unique morphology of their vegetative parts (broad, entire, dentate leaves) and their seeds which have a narrow circular marginal rim (more distinct at upper end of seeds forming a small scarious appendage). S. subspinescens, an undershrub endemic to certain parts 39 of Central Asia, has prickly branchlets, large loose flowers, and differs from other species of the genus S. in ecology, habits, and some other characters; under certain conditions it might be included in this genus. Owing to the uniqueness of this species Fischer and Meyer, the first to collect the plant, referred it to Brassica. The solution to these problems will be found, however, only after more appropriate material has been collected and studied.

Note. 2. In 1844, Bunge described a new species, S. decipiens, based on a specimen collected by Leman in the Upper Zeravshan area; the description appeared in Del. Sem. Hort. Dorpat., in Linnaea XVIII (1844) 555 and later in Rel. bot. Lehm. in Arb. Naturf. Ver. Riga I, 2 (1847) 153. This species is distinguished from the closely related S. brassiciforme by lyrate pinnatipartite leaves with narrow, lanceolate lateral lobes and a very long, lanceolate terminal lobe, shorter siliques, 35–45 mm long, and a few other characters. The plants from which Bunge described S. decipiens were given to him by Boissier; it appears that since then no one has collected this species in the USSR. I did not find any plant in herbaria (Leningrad and elsewhere) which might be related to S. decipiens. There is one specimen, however, in the Botanical Institute of the Academy of Sciences, collected by Korzhinskii in the Pamirs in 1897, which he identified as S. decipiens (with a question mark), but since this plant is devoid of ripe fruit it is impossible to decide definitively whether or not it belongs to S. decipiens Bge. I leave the problem of S. decipiens unsolved until the necessary material is available. I have not had the opportunity to study Leman's original specimen in the Cosson Herbarium in Paris.

1. Flowers yellow or white . . . . 2.
+ Flowers bluish pink . . . . 24. **S. subtilissimum** M. Pop.
2. Plants with acute subspiny branchlets, many-stemmed. Seeds with acute scarious appendages at summit . . . . 3.
+ Plants different. Branchlets and seeds not as above . . . . 4.
3. Leaves smaller, not longer than 1.5–3 cm, petals 8–10 (12) mm long . . . . 14. **S. isfarense** Vass.
+ Leaves large, 5–6 cm long, petals 12–15 mm . . . . 15. **S. subspinescens** (Fisch. et Mey.) Bge.
4. Tall plants (up to 1 m and higher), leaves large, entire, oblong-oval or oblong. Seeds with narrow circular rim . . . . 5.
+ Plants different. Leaves and seeds not as above . . . . 7.
5. Plants covered with rigid spreading hairs. Fruit 40–140 mm long . . . 6.
40 + Plants glabrous, fruit 15–20 mm long . . . . 2. **S. elatum** C. Koch.
6. Petals 7–8 mm long, fruit 40–60 (75) mm long . . . 1. **S. strictissimum** L.
+ Petals 12–14 mm long, fruit 80–140 mm long . . . . 3. **S. luteum** (Maxim.) O. E. Schulz.
7. Siliques 50–80 (100) mm long . . . . 8.
+ Siliques (10) 15–30 (45) mm long . . . . 15.

8. Siliques or pedicels densely short pubescent . . . . 9.
+ Siliques and pedicels glabrous . . . . 10.
9. Siliques glabrous, pedicels pubescent . . . . 6. **S. irio** L.
+ Siliques and their pedicels pubescent . . . . 19. **S. orientale** L.
10. Petals (10) 12–15 mm long, 5–8 mm broad . . . . 17. **S. bilobum** (C. Koch) Grossh.
+ Petals 4–8 (10) long, 1–3 mm broad . . . . 11.
11. Fruiting pedicels much thinner than siliques . . . . 12.
+ Pedicels as thick as siliques . . . . 14.
12. Plants glabrous, glaucous. Leaves large, oval, lyrate pinnatipartite . . . . 5. **S. brassiciforme** C. A. M.
+ Plants more or less pubescent. Leaves pinnatisect with oblong-lanceolate lobes . . . . 13.
13. Siliques 60–80 mm long, rather arcuate, pendulous; style long, ca. 0.5 mm long. Siberia . . . . 4. **S. heteromallum** C. A. M.
+ Siliques 40–65 mm long, erect; style 1–1.5 mm long. Caucasus . . . . 9. **S. erucastrifolium** (Rupr.) Trautv.
14. Lobes of cauline leaves narrow, linear . . . . 16. **S. altissimum** L.
+ Lobes of cauline leaves lanceolate, the terminal large, triangular . . . . 18. **S. daghestanicum** Vass.
15. Siliques more or less pubescent . . . . 16.
+ Siliques glabrous . . . . 17.
16. Siliques densely covered with short hairs . . . . . 11. **S. lipskyi** N. Busch.
+ Siliques sparsely covered with spreading hairs . . . . 17. **S. loeselii** L. f. **trichocarpum** N. Busch.
17. Leaves pinnate, terminal lobe much larger than lateral . . . . 18.
+ Leaves entire; if pinnate then the terminal lobe about as large as the lateral or slightly larger 19. 41
18. Plants glabrous, glaucous, perennial . . . . 13. **S. volgense** M. B.
+ Plants squarrose-hirsute, annual . . . . 7. **S. loeselii** L.
19. Siliques thin-cylindrical, 20–40 mm long, 0.75–1 mm broad . . . . . . 20.
+ Siliques 10–15 (20) mm long, 1–1.8 mm broad at base, distinctly constricted upward . . . . 23.
20. Plants glabrous (or glabrescent) . . . . 21.
+ Plants pubescent . . . . 10. **S. brachycarpum** (N. Busch) Vass.
21. Fruiting pedicels stout and short, 2.5–3 mm long, 0.75–1 mm broad. Crimea . . . . 20. **S. confertum** Stev.
+ Fruiting pedicels longer and thinner . . . . 22.
22. Cauline leaves pinnatipartite, with broad-lanceolate lobes; annuals . . . . 8. **S. turcomanicum** Litw.
+ Cauline leaves entire or pinnate, with narrowly linear lobes; perennials . . . . 12. **S. polymorphum** (Murr.) Roth.
23. Plants glabrous . . . . 21. **S. runcinatum** Lag.
+ Plants pubescent . . . . 24.
24. Siliques straight, appressed (together with pedicels) to stem . . . . 23. **S. officinale** (L.) Scop.
+ Siliques arcuate, bent . . . . 22. **S. hirsutum** Lag.

Section 1. NORTA (Adans.) DC., l. c., 461 emend. – Flowers yellow. Fruiting pedicels thinner than siliques. Leaves simple, broad, dentate.

1. **S. strictissimum** L., Sp. pl. (1753) 660; DC., Prodr. I, 191; Boiss., Fl. Or. I, 219; Voronov in Fl. Yugo-Vost. V, 389; Schulz, O. E. in Engler's Pflanzenr. IV, 105, p. 55. — Norfa strictissima Schur, Enum. pl. Transsilv. (1866) 54. — Exs.: Al. Lehm., rel. bot., No. 204.

Perennial plants; stem 50—200 cm tall, erect, densely leafy, covered with thin spreading, sometimes recurved hairs, branching at upper part; leaves short-petioled, oval or oblong-lanceolate, unevenly dentate, sometimes nearly entire, covered with minute hairs on both sides (more densely so below). Sepals linear-spatulate, with saccate inflation below apex, 3-nerved; petals linear-spatulate, 7—8 mm long, 1.5—2 mm broad, yellow; siliques 40—60 (75) mm long, ca. 1 mm broad, slightly compressed, arcuate, remote; style 0.75—1.5 mm long, terminating in a capitate distinctly bilobate stigma; fruiting pedicels 42 6—19 mm long, slender; seeds ca. 3 mm long, ca. 0.5 mm broad, with a scarious appendage at tip and a narrow filiform rim. May—June.

Forests, shrubs, riparian forests. — European part: U. V., V.-Kama, M. Dnp., V.-Don, Transv., L. Don. **Gen. distr.:** Centr. Eur., Bal.-As. Min. Described from Switzerland. Type in London.

2. **S. elatum** C. Koch, Ind. sem. Hort. Berol. Append. (1854) 14; Boiss., Fl. Or. I, 219; N. Busch, Fl. cauc. crit. III, 4, 224.

Perennials, more than 1 m tall, with stout branching stem, glabrous; leaves short-petioled, oblong-ovate or oblong, shortly dentate, sometimes nearly entire, the upper leaves oblong-linear, small. Racemes short, densely flowered, subcapitate, elongating during flowering; sepals 3—3.5 (4) mm long; petals 7—8 mm, yellow, oblong-oboval, tapering gradually below; fruit 15—20 mm long, slender, with capitate, bilobate stigma; fruiting pedicels 5—8 mm long; seeds ca. 1.5 mm long, 0.75 mm broad, elliptic. June—July.

Stony slopes. — Caucasus: S. Transc. Endemic. Described from plants grown in the Berlin Botanical Garden from seeds imported from Transcaucasia. Type in Berlin.

Note. An exceedingly rare plant; in the Herbarium of the Botanical Institute of the Academy of Sciences there are only three specimens of this species, collected by Masal'skii in Transcaucasia in 1886, at the springs of the Shakh-Tal (Mountain range) at about 3,500 m above sea level and classified by Bush (Busch).

3. **S. luteum** (Maxim.) O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 69 et in Beih. Bot. Centralbl. XXXVII, Abt. II, H. 1 (1918) 126; N. Busch, Fl. Sib. et Or. Extr. 6 (1931) 702. — Hesperis lutea Maxim. in Bull. Acad. Sc. St.-Pétersb. XVIII (1873) 282. — Ic.: O. E. Schulz (1924); N. Busch, l. c., 704 et tab. geogr. 705.

Perennial plant; stem erect, up to 0.5—1 m tall, simple or branching, densely leafy, with spreading, scattered, slender hairs (at least at the lower part); leaves large, the lower broad-oval, long-petioled, dentate at margin, subcordate or rounded at base, rarely cuneate, sometimes lyrate-pinnatipartite; cauline leaves short-petioled, narrowly oval, dentate, the upper smaller, lanceolate, subsessile, usually ciliate along margin and petioles. Sepals 7—9 mm long; petals yellow, 12—14 mm long, rounded at apex; siliques linear-cylindrical, subcompressed, 8—12 (14) cm long, ca. 1.5 mm broad, with beak 2—3 (4) mm long, on pedicels 8—12 mm long; seeds oblong, 1.5—2.5 mm long, 0.6—0.8 mm broad, with a narrow scarious appendage at tip. June—July.

Among shrubs and trees on coastal cliffs of seashores. — Far East: Uss. **Gen. distr.:** Jap.-Ch. Described from Ussuri (from the vicinity of Vladivostok). Type in Leningrad.

43 Section 2. **GRYPOLOBUS** O. E. Schulz, l. c., 84. — Flowers yellow. Fruiting pedicels slender. Silique long, more or less arcuate. Annual or perennial herbs with large lyrate leaves.

4. **S. heteromallum** C. A. M. in Ldb., Fl. Alt. III (1831) 132; N. Busch, Fl. Sib. et Or. Extr. I (1913) 142; Ldb., Fl. Ross. I, 178; Kryl., Fl. Zap. Sib. VI, 1281; O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 84. — Ic.: N. Busch, l. c., 143 et tab. geogr. 144.

Annuals or biennials, with erect stems branching at the upper part, 20—90 cm tall, covered at lower part with rigid squarrose divergent hairs, sometimes glabrescent; leaves large, runcinate, pinnatisect into 2—4 pairs of oblong-lanceolate, acute, more or less dentate lateral lobes, the terminal lobe similar to the lateral but several times longer; upper leaves small, linear, dentate. Sepals 3—4 mm long; petals yellow, 4—5 mm long, 1—1.5 mm broad; siliques numerous, 60—80 mm long, ca. 0.75(1) mm broad, glabrous, usually slightly arcuate below, with style ca. 0.5 mm long; fruiting pedicels 5—15 mm long, slender, drooping or pendulous, frequently one-sided; seeds elliptic, red-brown, 0.75—1 mm long, 0.5 mm broad. June—July.

Stony slopes and stony riverbanks. — W. Siberia: Alt.; E. Siberia: Yenis., Ang.-Say., Dau. **Gen. distr.:** Dzu.-Kash., Mong. Described from Altai. Type in Leningrad.

5. **S. brassiciforme** C. A. M. in Ldb., Fl. Alt. III (1831) 129; Ldb., Fl. Ross. I, 178; Kryl., Fl. Zap. Sib. VI, 1282; O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 85. — S. iskandericum Kom. in Tr. SPb O-va Est XXVI (1896) 95. — S. ferganense Korsh., Bull. Acad. Sc. St. Pétersb., IX, 5 (1898) 412. — Ic.: O. E. Schulz, l. c.

Biennial, glabrous, smooth and glaucous; stem erect, usually branching at upper part, 30—75 cm tall; cauline leaves sparse, large, oval, lyrately pinnatipartite into 1—2 (rarely 3) pairs of oblong-ovate, more or less dentate lateral lobes, the terminal lobe broad-oval, very large, much larger than the lateral, emarginate-dentate; the uppermost leaves entire, lance-linear or oval-lanceolate, entire (var. ferganense (Korsh.) O. E. Schulz). Sepals linear-lanceolate, 4—6 mm long; petals yellow, 8—10 (12) mm long, 2—3 mm broad; siliques numerous, glabrous, long and slender, 60—100 mm long, ca. 1 mm broad, rather arcuate, dropping; pedicels glabrous, recurved, subhorizontally recurved, slightly thinner than siliques, 4—8 mm long; stigma fleshy, capitate, subsessile; seeds oblong-elliptic, reddish brown, 1 mm long, 0.5 mm broad. June—July.

Stony slopes in mountains up to 4,500 m above sea level. — W. Siberia: Alt., Centr. Asia: Dzu.-Tarb., T. Sh., Syr D., Pam.-Al., Mtn. Turkm. **Gen. distr.:** W. Tib., Afghanistan. Described from Altai. Type in Leningrad.

44 Section 3. IRIO DC., l. c., 463 emend. – Flowers yellow. Siliques straight or slightly arcuate, on thin or thickened pedicels. Annual or perennial herbs, glabrous or more or less hairy.

6. **S. irio** L., Sp. pl. (1753) 659; Ldb., Fl. Ross. I, 179; DC., Prodr. I (1824) 192; Boiss., Fl. Or. I, 217; N. Busch, Fl. cauc. crit. III, 4, 216; O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 83.

Biennial, 10–50 (60) cm tall, glabrous or with sparse short hairs, mainly on the upper part; stem usually simple; lower leaves long-petioled, runcinate, pinnatipartite, with lanceolate rather dentate lobes, the upper larger than the lateral; upper leaves pinnatipartite, with narrow sublinear lobes. Racemes very short before flowering, subcorymbiform, then elongate; sepals 2.5–3 mm long; petals 3–3.5 mm long, yellowish; siliques 50–60 mm long, 0.75–1 mm broad, somewhat arcuate, glabrous, tuberculate, immature siliques directed upward, surpassing the flowering raceme; fruiting pedicels slender, 6–8 (12) mm long, densely covered with short and soft hairs; stigma subsessile, slightly bilobate; seeds reddish yellow, 1 mm long, 0.5 mm broad. March–April. (Plate II, Figure 3).

Weeds in gardens, by roadsides, in villages. – Caucasus: all regions; Centr. Asia: Mtn. Turkm., Pam.-Al. **Gen. distr.**: Centr. Eur. and Atl. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from western Europe. Type in London.

7. **S. loeselii** L., Cent. pl. I (1755) 18; Ldb., Fl. Ross. I, 178; Boiss., Fl. Or. I, 218; N. Busch, Fl. cauc. crit. III, 4, 208 et Fl. Sib. et Or. Extr. I, 140; Kryl., Fl. Zap. Sib. VI, 1280; Voronov in Fl. Yugo-Vost V, 389; O. E. Schulz in Engler's Pflanzenreich, IV, 105, p. 94. – Ic.: N. Busch, l. c., 141 et tab. geogr. 142. – Exs.: HFR No. 1555.

Annual with erect stem, branching mostly toward apex, rarely at base, 20–100 cm tall, covered with long, rigid, squarrose, divergent hairs; leaves lyrate and runcinate, pinnatisect, with terminal lobe large triangular-hastate, irregularly and strongly dentate, lateral lobes much smaller, lanceolate. Sepals lanceolate, 3–4 mm long, slightly yellowish; petals 5–7 mm long, 2–3 mm broad, yellow; siliques glabrous or sparsely covered with coarse short hairs (var. ciliatum Beck., f. trichocarpum N. Busch), (15) 25–30 (40) mm long, ca. 0.75 (1) mm broad, on thin pedicels 8–10 mm long; seeds light yellow, elliptic, triangular-convex at one side, 0.8–1 mm long, 0.5 mm broad. May–July.

Steppes, slopes, meadows and, as weeds, on light sandy soils. – European part: all regions; Caucasus: all regions; W. Siberia: all regions; Far East: Ze.-Bu.; Centr. Asia: all regions. **Gen. distr.**: all Europe, Bal.-As. 45 Min., Arm.-Kurd., Iran., Ind.-Him., Dzu.-Kash., Mong. Described from Prussia. Type in London.

8. **S. turcomanicum** Litw., Fl. Turkest. fragm. in Trud. Bot. Muz. Akad. Nauk. I (1902) 36; Fedtsch. in Beih. bot. Centralbl. XIX, 2 (1906) 317. – S. Loeselii O. E. Schulz in Engler's Pflanzenr. IV, 105 (1924) 98 p. p. – S. Loeselii f. glabra Lipsky in herb. et auct. Fl. turkest.

Annual, glabrous, 50–75 cm tall, with stem strongly branching; lower leaves long-petioled, lyrate-pinnatipartite into acute, broadly lanceolate lateral lobes and hastate terminal lobe, more or less dentate-lobed; upper leaves smaller, hastate, dentate, the uppermost lance-linear. Sepals glabrous, ca. 3 mm long; petals 6 mm long, yellow; siliques glabrous, 25–40 mm long, 0.75–1 mm broad, valves with 2 indistinct lateral nerves and a distinct midrib, style ca. 1 mm long, stigma slightly bilobate; fruiting pedicels (3) 5–7 mm long; seeds oblong, 1 mm long, 0.5 mm broad. May–June.

Stony slopes. – Centr. Asia: Mtn. Turkm., Amu D., Syr D. (?). **Gen. distr.**: Iran. Described from the Sandokskii Pass (near Ashkhabad), where it was collected on June 15, 1900, by Litvinov at the foot of precipitous cliffs about 1,500 m above sea level. Type in Leningrad.

Note. In Syr Darya District, transitional forms to S. loeselii have been observed: glabrous, but with leaves more approximate to the latter and longer fruiting pedicels.

9. **S. erucastrifolium** (Rupr.) Trautv. in A. H. P. IV, 1 (1876) 107; N.Busch, Fl. cauc. crit. III, 4, 213 p. p. (excl. var. brachycarpa); O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 99. – Erysimum erucastrifolium Rupr.,Fl. Cauc. (1869) 89, p. p.

Biennial, 30–60 cm tall, at least the lower part covered with coarse hairs; leaves pinnatisect, lateral lobes oblong-linear, more or less dentate to nearly entire, perpendicular to the petioles, subequal or equal in size to the oblong terminal lobe. Sepals 2.5–3.5 mm long; petals 5–8 mm long, yellow; siliques 40–65 mm long, ca. 0.75–1 mm broad, glabrous, style 1–1.5 mm long, stigma fleshy, bilobate, fruiting pedicels 8–15 mm long, glabrous, thinner than the siliques; seeds oblong, reddish brown, 1–1.5 mm long, ca. 0.5 mm broad. June–July.

Rocky slopes in the subalpine zone, up to 2,500 m above sea level. Caucasus: Cisc., Dag. Endemic. Described from Dagestan in the area of the villages of Rutul and Akhta. Type in Leningrad.

10. **S. brachycarpum** (N. Busch) Vass. in Addenda VII, p. 471. – S. erucastrifolium Rupr. f. brachycarpa N. Busch, Fl. cauc. crit. III, 4, 213; O. E. Schulz in Engler's Pflanzenr., IV, 105, p. 100.

46 Biennial (?), 30–75 cm tall, covered with thin and rigid spreading hairs mainly at the lower part; leaves oblong, pinnatisect, lateral lobes oblong-linear, more or less dentate, directed perpendicularly to petioles, approximately equal in size and shape to the terminal lobe. Sepals ca. 2.5–3 mm; petals 5–6 mm, yellow; siliques glabrous, 20–35 mm long, ca. 0.75 mm broad, style ca. 1 mm long, on thin pedicels (5) 8–10 mm long; seeds oblong, brown, 1 mm long, 0.5 mm broad. June–July.

Forest-steppes and forest areas of the Greater Caucasus (occurs also in steppes), on dry slopes, or as a weed by roadsides. – Caucasus: Greater Caucasus and Dagestan. Endemic. Described from Dagestan (Echeda, Sumada, Sagada, Khamaitlyakh). Type in Leningrad.

11. **S. lipskyi** N.Busch, Fl. cauc. crit. III, 4 (1908) 214. – S. erucastrifolium var. asperum Lipsky, Fl. Kavk. (1899) 225; O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 100.

Biennial, 30–50 cm tall, with branching stem and short coarse hairs; radical leaves long-petioled, cauline leaves on much shorter petioles, pinnatipartite, lateral lobes oblong or oblong-linear, dentate, the terminal hardly differing in size and shape from the lateral. Sepals 2.5–3.5 mm long; petals 5–7 mm long, yellow; siliques thin, 20–40 (45) mm long, ca. 0.75–1 mm broad, densely covered with short spreading hairs, slightly arcuate, with capitate bilobate stigma; fruiting pedicels thin, densely short-pilose, 7–9 (12) mm long; seeds small, linear-oblong, dark brown, 1 mm long, 0.4 mm broad. May–June.

Rocky slopes, from 1,000 to 3,000 m above sea level. – Caucasus: Greater Caucasus. Endemic. Described from Balkar-Kabardinian ASSR near the Khulamskii Pass. Type in Leningrad.

12. **S. polymorphum** (Murr.) Roth, Man. bot. II (1830) 946; Kryl., Fl. Zap. Sib. VI, 1282; O. E. Schulz in Engler's Pflanzenr. IV, 105. – S. angustifolium Rgl. et Schmalh., Descr. pl. turkest. (1882) 9. – S. junceum M. B., Fl. taur. cauc. II (1808) 114; N. Busch, Fl. cauc. crit. III, 4, p. 223 et Fl. Sib. et Or. Extr. I, 145. – Brassica polymorpha Murr., Nov. Comm. Goetting. VII (1776) 35. – Exs.: Al. Lehm, rel. bot. No. 107; HFR No. 653.– Ic.: N. Busch, Fl. Sib. et Or. Extr. I (1913) 146 et tab. geogr. 147.

Perennial, smooth and glaucous, glabrous (or covered with short hairs at lower part), 20–70 cm tall; stem branching (sometimes from the base); leaves rather fleshy, the lower petioled, pinnatipartite or pinnatisect into narrow, linear, more or less dentate or entire lobes, the terminal longer than the lateral, cauline leaves entire, linear or pinnatipartite, the
47 upper narrow-linear or subfiliform, entire. Racemes loose; sepals light yellowish, glabrous or pilose, 4–5 mm long; petals pale yellow, 6–9 mm long; siliques ascending, 25–35 mm long, ca. 0.75 mm broad, linear-tetragonous-cylindrical, glabrous, slightly tuberculate, style fleshy, short, ca. 1 mm long; fruiting pedicels thin, 5–7 (10) mm long; seeds elliptic, red-brown, 1 mm long, 0.5 mm broad. April–June. (Plate II, Figures 2 and 3).

Clayey steppes, rocky slopes, river terraces, sometimes as weeds in fallow and cultivated fields. – European part: U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V., Urals; Caucasus: Cisc.; W. Siberia: all regions; E. Siberia: all regions; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh., Syr D., Pam.-Al. **Gen. distr.**: Centr. Eur., Bal.-As. Min., Mong. Described from Western Europe.

Note. S. polymorphum (Murr.) Roth is an extremely polymorphic species, which requires further examination. Within the range of this species, one may note: 1) var. latifolium (Korsh.) O. E. Schulz (S. junceum M. B. var. latifolium Korsh.), distinguished by broad oblong leaves of which the lower are more or less emarginate-dentate to pinnatipartite, and the cauline entire, up to 7–10 cm long and 6–15 mm broad. Known from the area of the Alai Range; 2) var. soongoricum (Rgl. et Herd.) O. E. Schulz (S. junceum M. B. var. soongoricum Rgl. et Herd.), with pilose pedicels and rather pilose sepals, found in the east (Central Asia and the Lower Volga region, in Altai); 3) var. pinnatisectum Vass., with pinnatisect cauline leaves (sometimes with pinnatifid, partite or dentate segments), found on the chalky soils of the Volga region and in the Urals.

13. **S. volgense** M. B. ex Ldb., Fl. Ross. I (1842) 178 nom. nud.; Shmal'g., Fl. Yuzhn. i Sr. Ross. I (1895) 66; Voronov in Fl. Yugo-vost V (1931) 390; O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 104. – Ic.: Voronov, l. c.

Perennial, 30–75 cm tall, glaucescent, glabrous, pubescence at lower part with short soft hairs; stem branching; lower and middle leaves long-petioled, lyrate-pinnate-lobate or pinnatipartite, with a few oblong-lanceolate lateral lobes, the terminate lobe large broad-oval, more or less deeply repand, irregularly callosed, emarginate-dentate, pubescent at apex and along petioles; upper leaves small, oblong, more or less denticulate with callosed, thickened teeth. Sepals 3.5–4 mm long; petals yellow (sometimes white – var. albiflorum Iljin), 7–9 mm long; siliques glabrous, tetragonous-cylindrical, somewhat flattened, 25–40 (45) mm long, ca. 1–1.2 mm broad, frequently slightly curved, rather tuberculate, 48 ascending to erect, with a very short style and capitate stigma, fruiting pedicels thick above, 5–10 mm long; seeds elliptic, angular, yellowish brown, 1.2 mm long, 0.75 mm broad. May–July

Steppes; also as weeds. – European part: L. Don, L. V. Endemic. Dispersed by wind along railroad lines to the north – Moscow, Leningrad, and other places. Described from the Lower Volga (from the Krasnoarmeisk District, formerly Sarepta). Type in Leningrad.

Economic importance. In view of its capability of propagating shoots from the roots, this plant is regarded as a noxious weed.

14. **S. isfarense** Vass. in Addenda VII, p. 472. – S. subspinescens var. kokanicum M. Pop. in Tr. Turk. Univ IV (1922) 50. – Exs.: H. F. A. M. No. 81.

Perennial, 25–40 cm tall; leaves small, not longer than 1.5–3 cm (without petioles), oblong or oblong-oboval, short-petioled, with remote obtuse teeth or lobes, the upper leaves entire, the lower usually lobed. Sepals yellowish, 6–7 (8) mm long; petals 8–10 (12) mm long, 1.5–2 mm broad, slightly tapering at base, nearly as broad as long; siliques 50–70 mm long, ca. 1–1.2 mm broad, glabrous, stigma capitate, fleshy with folded lobes; fruiting pedicels 6–8 (10) mm long, almost as thick as siliques and markedly divergent from stem, ascending; seeds 2–2.5 mm long, 0.8 mm broad, linear-oblong, yellow-brownish, with an acute scarious appendage at the apex. April–May.

Calcareous slopes. – Centr. Asia: Syr D. Endemic. Described from the petroleum processing areas of Santo near Kokand, Kanibadam, and Isfara (Tadzhikistan). Type in Leningrad.

15. **S. subspinescens** (F. et M.) Bge. in Al. Lehm., rel. bot. Arb. naturf. Ver. zu Riga I (1847) 151; O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 105. – Brassica subspinescens Fisch. et Mey. in Bull. Soc. Nat. Mosc. XII (1839) 145 nom. nud.

Perennial, 40–60 cm tall, with erect branching stems; leaves oblong, large, ca. 5–6 cm long (without petioles), ca. 1 cm broad, pinnate, large-toothed, pinnatipartite at the lower part, with 1–2-pairs of lanceolate lobes, subperpendicular to petiole; lower leaves on broad, very long petioles, upper leaves sessile, more or less dentate, the uppermost entire; 3 veins protruding on the lower surface parallel to each other at the lower third of leaf (in center of blade), then the lateral diverging upward from midrib. Racemes loose; sepals oblong, glabrous, 8–10 mm long, ca. 2 mm broad; petals yellow, 12–15 mm long, 2–3 cm broad, slightly tapering at base; 49 pedicels 10–12 mm long; siliques linear-cylindrical, glabrous, 30–60 mm long, ca. 1.5 mm broad, stigma large with fleshy divergent lobes at summit; fruiting pedicels thickened 10–15 mm long; seeds with acute scarious appendage at apex. May. (Plate III, Figure 1).

Slopes, cliffs (clayey ?). – Centr. Asia: Ar.-Casp., Balkh. Endemic. (?). Described from the hills of Airakli on the eastern banks of the Caspian Sea. Type in Leningrad.

Section 4. **PACHYPODIUM** (Webb et Berth.) Fourn. Rech. Crucif. (1865) 86, p. p. emend. — Petals yellow. Fruiting pedicels thick, as thick as siliques. Plants annual or biennial, covered with simple hairs.

16. **S. altissimum** L., Sp. pl. (1753) 659; Kryl., Fl. Zap. Sib. VI, 1279, O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 116. — S. sinapistrum Crantz, Class. Crucif. (1769) 138; N. Busch, Fl. cauc. crit. III, 4, p. 221. — S. pannonicum Jacq., Ic. pl. rar. I (1781) 12; DC., Prodr. I, 193. — Ic.: O. E. Schulz, l. c. — Exs.: HFR No. 1457.

Annual or biennial, 20—75 cm tall; stem stout, divaricately branched, covered below with coarse simple hairs, glabrous or subglabrous above; lower leaves petioled pinnatipartite into broad-lanceolate lobes, cauline leaves pinnatisect into long narrow-linear lobes, the upper pinnatisect, with narrow-linear to subfiliform lobes. Sepals glabrous, lanceolate, 4—5 mm long; petals pale yellow, nearly white post anthesis, oblong-oblanceolate 7—9 (10) mm long, 2—3 mm broad; siliques long, tetragonous-cylindrical, erect, coarse, 60—100 mm long, 1.2—1.5 (1.8) mm broad; fruiting pedicels 6—8 (10) mm long, as thick as siliques, ascending; stigma capitate, subsessile, bilobate; seeds broad-elliptic, subtetragonous, dark brown, 1—1.2 mm long, 0.6 mm broad. April—July.

Weed in fields, fallow fields, and roadsides. — European part: Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V. -Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., E. and S. Transc.; W. Siberia: Alt.; Centr. Asia: all regions. **Gen. distr.:** Centr. and Atl. Eur., Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Dzu.-Kash., N. Am. Described from Italy, France, Siberia. Type in London.

Note. Within the range of this species there are: f. ucrainicum (Blonski) Thell. in Hegi, Ill. Fl., with siliques bilaterally covered with remote hairs (= f. trichocarpum N. Busch, l. c.), var. abortivum (Fourn.) Thell. in Hegi, l. c. (= S. brachypetalum C. A. M. in Fisch. et Mey. Enum. pl. nov. Schrenk. II (1842) 58) with reduced petals (narrow-linear in which only the claw, 4—5 mm long, is developed), equaling sepals in length.

17. **S. bilobum** (C. Koch) Grossh., Fl. Kavk. II (1930) 163. —
50 S. septulatum DC., Syst. nat. II (1821) 451 p. p. et O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 120, p. p. — S. Columnae Jacq. f. glabrescens, floribus majoribus Litw., Tr. Bot. Muz. Adad. Nauk. I (1902) 35. — S. erucastroides Bornm., Bull. Herb. Boiss. IV, 12 (1904) 1263. — Diplotaxis biloba C. Koch in Linnaea XV (1841) 252.

Annual or biennial with erect branching stem covered at lower part with slender remote hairs; leaves oblong, petioled, the lower pinnatilobate (to pinnatisect), lateral lobes lanceolate, dentate, adjacent, remotely perpendicular to petioles, terminal lobe orbicular, obtuse-angular; upper leaves pinnatisect with narrow linear-lanceolate lobes. Sepals 6—7 mm long, the outer with a small horn at apex, up to 1.2 mm long, the inner with a short tubercle; petals yellow (when dry, white), 10—15 mm long, 5—8 mm broad, oboval, fan-nerved with distinct divergent veins, tapering below into a claw; siliques 50—60 mm long, 1.5—1.8 mm broad, glabrous, elongating into a style, stigma with two distinct divergent lobes; fruiting pedicels nearly as thick as siliques, 4—6 mm long. March—May. (Plate II, Figure 4).

Weed. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm., Amu D., Pam.-Al. **Gen. distr.**: Iran. Described from southern Transcaucasia (Echmiadzin). Type in Berlin.

18. **S. daghestanicum.** Vass., sp. nova in Addenda VII, p. 472. — S. orientale var. leiocarpum DC., Prodr. I (1824) 193 p. p. et N. Busch in Fl. cauc. crit. III, 4, p. 220.

Annual, 40—60 cm tall, with somewhat branching stem, beset with rigid spreading hairs; leaves finely hirsute, the lower runcinate-pinnatisect, lateral lobes lanceolate, dentate, retrorse, the terminal lobe large, triangular; upper leaves with lateral lobes narrow, linear, retrorse and terminal lobe longer and larger, oblong. Sepals lanceolate, pubescent, 3—4 mm long; petals yellowish (in herbaria), 6—8 (10) mm long; siliques erect, glabrous, 60—80 mm long, 1.5—1.8 mm broad; fruiting pedicels 5—7 mm long, somewhat thinner than siliques, beset with isolated hairs; stigma small, capitate, bilobate; style ca. 2 mm long; seeds ca. 1 mm long, 0.5—0.6 mm broad, brown-reddish, triangular-convex at one side. May.

Weed. — Caucasus: Dagestan. Endemic. Described from Dagestan. Type in Leningrad.

19. **S. orientale** L., Cent. pl. II (1756) 24; N. Busch in Fl. cauc. crit. III, 4, p. 218 (excl. var. leiocarpa DC.); DC., Prodr. I, 193, p. p.; O. E. Schulz in Engler's Pflanzenr. IV, 105, p. 122 p. p. — S. orientale var. hebecarpum N. Busch, Fl. cauc. crit. III, 4, p. 218.

Annual or biennial, 30—100 cm tall, with branched stem, densely
51 pubescent, lower leaves large, oblong, pinnatipartite into lanceolate undulate-dentate lateral lobes and a triangular, trilobulate, remotely dentate terminal lobe; cauline leaves pinnatipartite, with narrowly lanceolate lateral lobes and elongated apical lobe; upper leaves linear, sagittate, with 1—2 narrow linear lobes at base. Sepals linear lanceolate, slightly pubescent, 4—5 mm long; petals yellowish, oblong-obovate, 8—10 mm long, 2—3 mm broad; siliques 60—100 mm long, 1—1.2 mm broad, densely short-pubescent; fruiting pedicels 4—7 mm long, thickened, almost as thick as siliques; stigma obtuse, capitate, style short; seeds 1 mm long, 0.6 mm broad, brown-reddish. April—June. (Plate II, Figure 1).

On dry (calcareous ?) slopes and as a weed. — European part: Bl., Crim.; Caucasus: W. Transc. **Gen. distr.**: Centr. and Atl. Eur., Med., Bal.-As. Min., Iran., Aust. Described from the East. Type in London.

Section 5. **CHAMAEPLIUM** (Wallr.) Thell. in Hegi, III, Fl. IV (1916) 156; Wallr. Sched. crit. I (1822) 376, pro gen. — Petals yellow. Fruiting pedicels short, thickened. Raceme bracteate. Siliques more or less curved. Annual plants, glabrous or pilose.

20. **S. confertum** Stev., Bull. Soc. Nat. Mosc. XXVII (1854) 304; Shmal'g., Fl. I, 65; N. Busch in Fl. cauc. crit. III, 4, p. 200. — S. polyceratium M. B., Fl. taur.-cauc. II (1808) 111; Ldb., Fl. Ross. I, 182. — S. polyceratium prol. confertum O. E. Schulz in Engler's Pflanzenreich, IV, 105 (1924) 131.

Perennial, up to 75 cm tall, with branching glabrous stem, sometimes slightly pilose (f. ciliatum N. Busch); leaves large, oblong, the lower petioled, pinnatipartite, with triangular, unevenly large-toothed lobes, the apical somewhat differing in size and shape from the lateral, or almost equal to them, sometimes even smaller, upper leaves minute, oblong. Flowers small, ca. 3 (4) mm in length, yellowish, the lower axillary, the upper in a long bracteoled raceme; siliques 35—40 mm long, about 1.2 mm broad, numerous, retrorse, glabrous, with 1—1.5 mm long style and small capitate, slightly bilobate stigma; fruiting pedicels 2.5—3 mm long, ca. 0.75—0.1 mm thick.

European part: Crim. **Gen. distr.:** Bal.-As. Min. (known in the Instanbul area). Described from the Crimea. Type in Helsingfors.

21. **S. runcinatum** Lag. ex DC., Syst. nat. II (1821) 478 et Prodr. I, 194; Ldb., Fl.Ross. I, 182; N. Busch, Fl. cauc. crit. III, 4, p. 199, excl. var. hirsutum; O. E. Schulz in Engler's Pflanzenr., IV, 105, p. 131 p. p.

Annual, 5—50 cm tall, divaricately branched from base, branches ascending 52 or prostrate, glabrous, glaucescent; leaves runcinate, pinnatipartite, with lanceolate lateral lobes and a larger apical lobe, radical leaves long-petioled, the cauline with shorter petioles, upper leaves narrow, oblong. Racemes long, almost from base of stem, loose; flowers axillary in bracts hardly differing from the cauline leaves; sepals 1.5 mm long; petals yellow, 2.5—3 mm long; siliques numerous, glabrous, more or less arcuate, 10—15 (25) long, 1.5—1.8 mm broad below, tapering upward to 1.2 mm; valves with slender midrib and pinnate more or less narrowed lateral veins; style abruptly separated at base from silique by a girdle, fleshy, 1—2 mm long, stigma fleshy, capitate, slightly bilobate; fruiting pedicels thickened, 1—2 mm long; seeds yellowish-reddish, 0.8—1 mm long, 0.5 mm broad. April—May. (Plate II, Figure 2).

Dry slopes, taluses, and as a weed. — Caucasus: E. and S. Transc.; Centr. Asia: Mtn. Turkm. **Gen. distr.:** Med., Iran., Bal.-As. Min., Arm.-Kurd., Mesopotamia. Described from Spain. Type in Geneva.

22. **S. hirsutum** Lag. ex DC., Syst. II (1821) 478 et Prodr. I, 194. — S. runcinatum var. hirsutum Coss. in Bull. Soc. bot. France (1859) 609; O. E. Schulz in Engler's Pflanzenr. IV, 105, 133; N. Busch, Fl. cauc. crit. III, 4, 200. — S. runcinatum var. villosum Boiss., Fl. Or. I (1867) 220.

Annual, (5) 15—40 cm tall, branching from base, branches ascending or prostrate, densely pubescent with soft, fine hairs; lower leaves runcinate, pinnatipartite, lobes lanceolate, pilose at both sides, upper leaves small, oblong. Flowers in long loose racemes, in axils of small bracts; sepals up to 1.5 mm long; petals ca. 3 mm long; siliques slightly arcuate, densely pubescent, with fine hairs, 10—15 (25) mm long, 1.5—1.8 mm broad (at base), tapering to a short fleshy style; stigma fleshy, slightly bilobate; fruiting pedicels 1—2 mm long, densely pubescent with fine hairs. April—May.

Dry slopes and as a weed. — Caucasus: E. and S. Transc. **Gen. distr.:** Med., Mesopotamia. Described from Spain, environs of Madrid. Type in Geneva.

Section 6. VOLARUM DC., l. c., 459. — Petals yellow. Fruiting pedicels short, as thick as siliques. Siliques appressed to stem, short. Annual or biennial plant, covered with simple hairs.

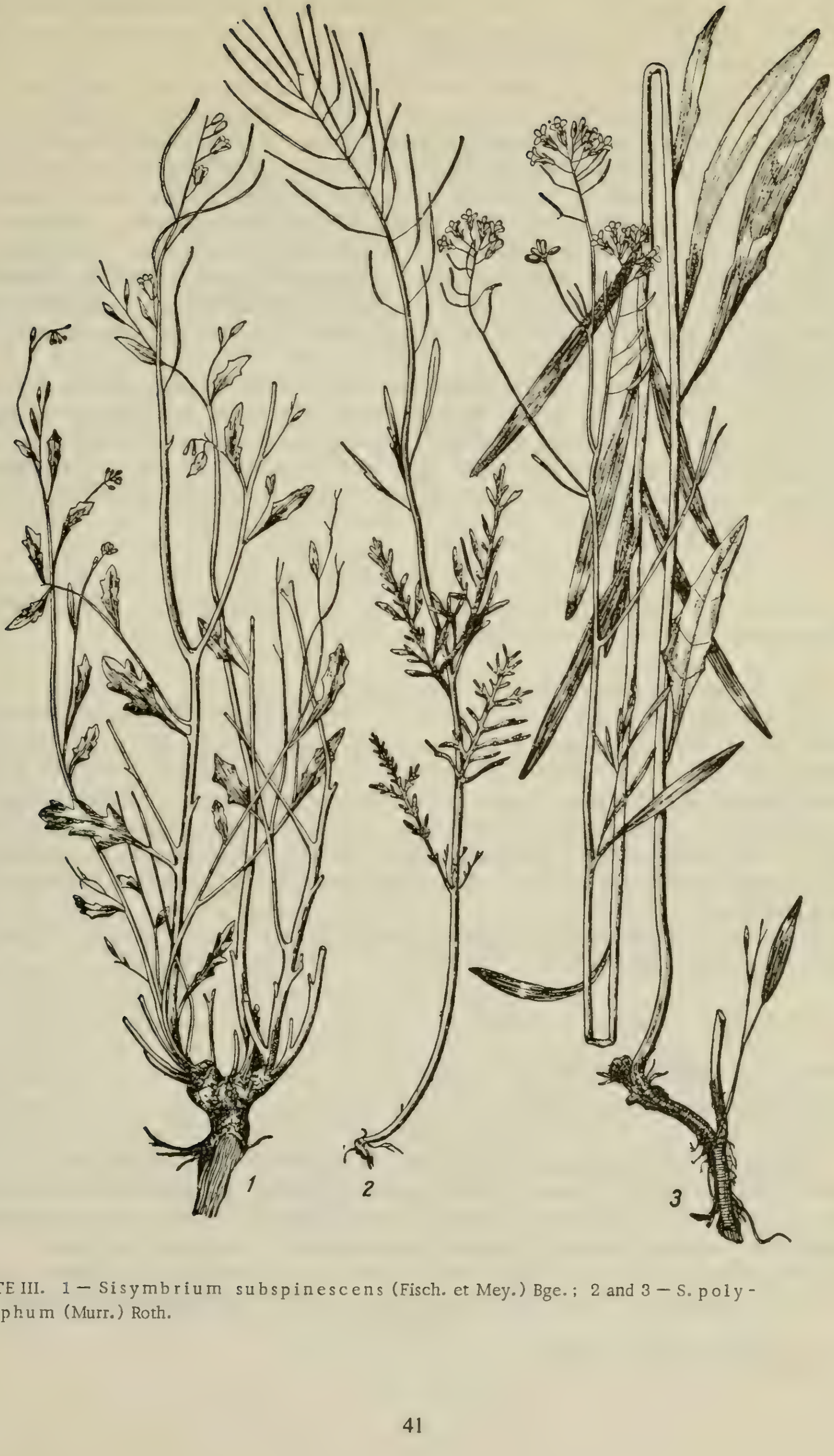

PLATE III. 1 — Sisymbrium subspinescens (Fisch. et Mey.) Bge.; 2 and 3 — S. polymorphum (Murr.) Roth.

23. **S. officinale** (L.) Scop., Fl. carn. 2, ed. II (1772) 26; DC., Prodr. I, 191; 55 Boiss., Fl. Or. I, 220; N. Busch, Fl. cauc. crit. III, 4, 201 et Fl. Sib. et Or. Extr. I, 138; Kryl., Fl. Zap. Sib. VI, 1278; O. E. Schulz in Engler's Pflanzenreich IV, 105, 137. – Erysimum officinale L., Sp. pl. (1753) 660. – Ic.: N. Busch, Fl. Sib. et Or. Extr. I (1913) 139 et tab. geogr. 140.

Annual, 15–60 cm tall; stem erect, divaricately branched, pubescent, with hairs coarse, short, and dense, some rather long; lower leaves petioled, pinnatisect, lateral lobes oblong-lanceolate, unevenly dentate, slightly retrorse, apical lobe larger, subhastate; upper leaves hastate or subsagittate, small, sessile. Flowers in narrow subspicate racemes; sepals pilose, lanceolate, 2–2.5 mm long; petals yellow, 3–4 mm long; siliques subulate, tapering gradually toward summit, 10–15 mm long, 1–1.5 (1.8) mm broad, densely covered with fine hairs, appressed to stem together with pedicels; fruiting pedicels short (1.5–2 mm long), as thick as siliques; style narrowly conical, slender, 2–3 mm long; seeds reddish brown, angular, 1.5–2 mm long. June–July.

Weed in fields, near hedges, roadsides, etc. – European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V. -Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: all regions; W. Siberia: all regions; E. Siberia: all regions; Far East: Ze.-Bu. Gen. distr.: Scand., Centr. and Atl. Eur., Med., Bal.-As. Min., N. Am., Aust. Described from Western Europe. Type in London.

Section 7. **TENERITAS** Vass. – Glabrous annual plants. Stem slender, dichasially branching. Flowers small, blue.

24. **S. subtilissimum** M. Pop., Not. syst. 2, V (1924) 38.

Annual plant with slender stem 10–15 (18) cm high, forkedly branching from the middle or at base, glabrous or with sparse simple hairs; leaves linear, obtuse, small, entire. Flowers solitary, on slender pedicels; sepals lance-linear, glabrous, ca. 1–1.25 mm long; petals linear, slightly widening at apex, bluish pink, ca. 2–2.5 mm long; siliques linear, flattened, glabrous, 20–25 mm long, ca. 0.75 mm broad, style 0.5–0.7 mm long, stigma obtuse; fruiting pedicels slender, 8–10 mm long, ascending (= obliquely antrorse). May–June.

Clayey and stony slopes. – Centr. Asia: Pam.-Al. Endemic. Described from the Shakhrisyabz area (Uzbekistan). Type in Leningrad.

Genus 570. **PHRYNE*** BUB.**

Bubani, Fl. pyren. III (1901) 171 (part.); Schulz, Sisymbrieae in Pflzr. IV, 105, p. 169.

Sepals ascending, unequal, the inner saccate. Petals white, oboval, 56 emarginate at apex. Lateral nectariferous glands semicircular, open inside, the median connate with the lateral. Ovary sessile, style very short, slightly thickened, stigma flattened, capitate, subbilobate. Pedicels filiform. Siliques linear, slightly compressed, valves with strongly prominent midrib and thin, longitudinal, frequently reticulate veins. Septum membranous.

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* From the name Phryne (Greek).

** Treatment by N. A. Bush.

Seeds uniseriate, ellipsoidal, slightly flattened, brown, very small and densely granulate-striate. Embryo erectly or obliquely notorrhizal. Cotyledons narrowly elliptic, nearly as long as radicle.

Four species, common in the alpine altitudes of the mountains of Europe, the Caucasus, and Near Asia. Only one is present in the USSR.

1. **P. hueti** (Boiss.) Schulz in Pflzr. IV, 105 (1924) 174. — Arabis petraea M.B., Fl. taur.-cauc. III (1819) 447 part. (non Lam.). — Sisymbrium hueti Boiss., Fl. Or. I (1867) 957 et Suppl. (1888) 31, 62. — Arabidopsis pinnatifida var. caucasica Rupr., Fl. Cauc. (1869) 86. — A. hueti N. Busch in A. H. P. 28 (1908) 389 et in Fl. cauc. crit. III, 4, p. 461.

Perennial, pubescent, with soft branched hairs visible under magnification; roostock multicipital; stems many, 5—15 cm (f. pumila Alb.) or 20—30 cm (f. elatior Alb.), branching or simple; leaves pinnatipartite, the radical petioled, rosulate, cauline leaves few, sessile, rarely petioled (f. foliosa S. et L.), auriculate; leaf lobes small, oboval or oblong, obtuse, upper leaves linear, acute. Sepals 2—3 mm long; petals white, 5—7 mm long; raceme loose, pedicels 5—11 mm long, ascending or recurved; siliques linear, broadly flattened, 2.5—5.5 cm, rarely up to 8 cm long (f. dolichocarpa S. et L.), sometimes 1.5—2.5 cm long (f. brachycarpa S. et L.), glabrous, slightly curved; stigma sessile; seeds narrowly winged. June—July.

Gravels, glacial moraines, from 1,200 to 3,500 m above sea level. — Caucasus: W. and E. Transc., Dag., S. Transc. Gen. distr.: Arm.-Kurd., Iran. Described from Turkish Armenia near Tasköprü. Type in Geneva, cotype in Leningrad.

Genus 571. **ALYSSOPSIS** * BOISS.**

Boiss. in Ann. Sc. Nat. Bot. 2 Sér. XVII (1842) 57; Dielsiocharis Schulz in Pflzr. IV, 105 (1924) 184.

Sepals obtuse, ascending, not saccate. Petals yellow, short-clawed. Filaments of stamens broadening toward base, edenticulate. Nectariferous glands connate, lateral glands ring-shaped, the median tuberculate. Ovary 10—13-ovuled. Siliques short, terete, obtuse at both ends, style slender, short. Septum with a median strand. Seeds subbiseriate, oblong or obovoid, 57 brown; embryo notorrhizal. Small gray perennial with branched hairs; leaves simple, entire.

Monotypic Iranian genus of high mountains.

Since the diagnosis of the genus Alyssopsis Boiss., l. c., matches with A. kotschyi Boiss. (short siliques, etc.) and since the other species, A. mollis (=A. sagittate) whose siliques described as short on the basis of immature specimens turned out to be long and flattened, was therefore transferred to the genus Arabis under the name A. secunda N. Busch, there is no basis for renaming the species Alyssopis kotschyi as Dielsiocharis. For this reason I retain the generic name Alyssopsis for the species Alyssopis kotschyi.

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* From Alyssum and opsis — species.

** Treatment by N. A. Bush.

1. **A. kotschyi** Boiss., Diagn. I, Sér. VI (1845) 14; Fl. Or. I, 182 et Suppl. (1888) 36. — Dielsiocharis kotschyi Schulz in Pflzr. IV, 105 (1924) 184. — Ic.: Schulz, l. c., 185.

Perennial, the entire plant — including sepals — hoary with short branched hairs, or greenish (f. umbrosa (Bornm.) Schulz); rootstock stout, 5—10 mm in diameter, strongly branched above and covered with decayed leaves; leaves rosulate, narrowly oboval, rounded at apex, entire or with inconspicuous teeth, cuneately tapering to the 1—2.5 cm long petiole. Racemes numerous, corymbose in fruit, up to 10 cm long, 10—20-flowered; pedicels ascending, in fruit 5—10 mm long, often recurved at tip; sepals 2—3 mm long, greenish yellow, with membranous margin, oblong; petals 3—5 mm long, oblong-oval, rounded at apex, short-clawed; siliques straight or curved, 3—10, usually 4—5.5 mm long, 0.75—1.2 mm broad, obtuse, densely white-pubescent, style 0.75 mm long; seeds few (5—6) in each cell. May—June.

Crevices of cliffs, 1,800—3,800 m. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** Iran. Described from southern Iran (Kuh-e-daena and Kuh-e-barri). Type in Geneva, cotype in Leningrad.

Genus 572. **APHRAGMUS** * ANDRZ.**

Andrz. in DC., Prodr. I (1824) 209.

Sepals ascending, soon deciduous, not saccate at base, with narrow membranous rim. Petals white or lilac. Stamens edenticulate, with slender filaments. Lateral nectariferous glands semicircular, open inside, connate with the median glands. Ovary subsessile, style short, stigma compressed-capitate. Fruit a silicle, oblong or ellipsoidal, acuminate at both ends, slightly compressed. Valves with a midrib, veined. Septum (if there is one) strongly hyaline, nerveless. Seeds biseriate, very large, ovate or sub-
58 globular, smooth. Cotyledons elliptic, stout. Embryo notorrhizal. Dwarf perennials, with simple, entire, fleshy, glabrous leaves, and small flowers. Flower scapes few, bearing involute leaves only at the base of the short raceme.

A genus of 3 species. Very rare plants, occupying areas disjunctive and remote from each other. A. involucratus Bge. Schulz grows in Altai, A. tibeticus Schulz in Tibet, and A. eschscholtzianus Andrz. on Unalaska Bay. The distribution route from Central Asia to the Arctic, along the mountains of East Siberia, will become clearer when more material of these tiny, hence unnoticed species, becomes available.

1. **A. involucratus** (Bge.) Schulz in Pflzr. IV, 105 (1924) 198; N. Busch, Fl. Sib. et Or. Extr. 6 (1931) 587. — Platypetalum involucratum Bge., Enum. (1836) 58. — Braya involucrata Ldb., Fl. Ross. I. (1842) 194, 763. — Ic.: N. Busch, l. c., 588 et tab. geogr. 588.

Perennial, with fusiform root; stems 1—1.5 cm long, ascending, covered at base with remnants of petioles, leafy only at the summit, densely pubescent with minute, obtuse, spreading hairs; lower leaves with petioles nearly as long as blade, oblong, oboval or spatulate, rounded at apex, entire, cauline leaves oval, tapering to a short petiole, upper leaves up to 10, subsessile, congested under the corymbose raceme and resembling an involucre. Raceme 5–12-flowered; sepals ca. 2 mm long; petals lilac, ca. 3 mm long, oboval, few-nerved, with undulate margins, tapering into a claw; ovary 10–12-ovuled; fruiting pedicels 1.5–2 mm long; silicle ellipsoidal, 5–10 mm long, glabrous; style 1 mm long; septum present, perfect, nerveless. July–August.

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* From the Greek: a — without and phragmos, phragma — fence.

** Treatment by N.A.Bush.

High mountains. – W. Siberia: Alt. (Chuya near Chegan-Uzun). Endemic. Described from the mountains of Altai adjacent to the Chuya River. Type in Leningrad.

Genus 573. **MARESIA** * POMEL **

Pomel Nouv.Mater.Fl.Atl.(1874) 228.

Sepals erect or suberect, the outer linear, the inner broader, saccate at base. Petals oblong or oboval. Filaments broadened at base. Lateral nectariferous glands bilobate in our species, median glands absent. Stigma compressed-capitate, slightly bilobate. Siliques linear, style slender, valves with a stout midrib and thinner lateral veins. Seeds uniseriate,
59 flattened, smooth, embryo erectly or obliquely notorrhizal. – Annuals.

A genus of five species common in and almost exclusive to the Mediterranean region, found along marine sands.

This genus is represented by only one species in the USSR; like many of the Mediterranean types it is distributed in the eastern, not western, part of the Caucasus, along the shores of the Caspian Sea.

1. **M. nana** (DC.) Battand. in Battand. et Trab., Fl. Alg. Dic. (1888–1890) 68 et Fl. anal. syn. Alg.-Tun. (1902) 35; Schulz in Pflzr. IV, 105, 206. – Sisymbrium? nanum DC., Syst. II (1821) 486 (excl. patria); Ldb., Fl. Ross. I, 181. – S. binerve C.A.M., Verz. Cauc. (1831) 189, No. 1651. – Malcolmia binervis Boiss., Ann.Sc.Nat. bot., Sér. 2, XVII (1842) 7. – M. nana Boiss., Fl. Or. I (1867) 222; N. Busch in Fl. cauc. crit. III, 4, 633. – Ic.: Jaub. et Spach, Ill.pl. Or. III (1847–1850) 289 (sub Sisymbrio binervi). – Exs.: HFR No. 1004.

Annual, plant hoary with short, soft, stellate hairs; stem branching from base, 5–27 cm high, flexuous, branches slender ascending-erect; leaves small, the lower oblong-oboval or narrow-oblong, dentate or pinnatipartite into lanceolate, obtuse lobes, the upper leaves entire, linear. Racemes short, elongating at flowering; sepals 2–3 mm long, ca. 0.75 mm broad, obtuse, densely pubescent, narrowly white-membranous along margin; petals pink-lilac, pale at the beginning, darkened at the end, 3.5–6 mm long, up to 1.5 mm broad at tip; fruiting pedicels 5–8 mm long; siliques very slender, moniliform-tuberculate, 12–28 mm long, 0.75–1 mm broad; valves with midrib; style cylindrical, 0.75–1 mm long; septum slender, pale, hyaline, with 2 longitudinal strands; seeds ellipsoidal, light brown, glossy, smooth, 0.7–0.9 mm long, 0.3–0.5 mm broad. March–April.

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* Named for the botanist, Paulo Marès, who studied the flora of Algeria, the Balearic Islands, and other parts of the Mediterranean region.

** Treatment by N. A. Bush.

Marine sands. — Caucasus: E. Transc., Tal. **Gen. distr.:** Med., Bal.-As. Min., Iran. (north). Described from Algeria. Type in Geneva.

Genus 574. **TORULARIA*** O. E. SCHULZ**

O.E.Schulz, in Engler's Pflanzenr.IV, 105 (1924) 213.

Sepals erect, oblong, usually not saccate at base. Petals white, yellow, bluish pink or pink to nearly purple. Filaments edentate. Nectariferous glands lateral only. Siliques cylindrical, tuberculate, frequently submoniliform, straight or contorted. Septum strandless. Embryo notorrhizal. Annual or perennial herbs, with branched and simple, sometimes glandular hairs.

Genus predominantly Mediterranean-Central Asian.

60 Note. 1. Shul'ts (O. E. Schulz, l. c.) who described T. rossica O. E. Schulz (ibid. 217) based his determination on Wiesenmeyer's specimens, labelled from "Simbirsk." I was unable to find such specimens at the BIN† Herbarium; equally unsuccessful was Yu. N. Voronov, who had begun a very careful search before me. He was able, however, to obtain several specimens of T. rossica from the Kew Botanical Gardens.

Nonetheless, in view of the lack of more precise data and due to the faulty (?) plants collected by Wiesenmeyer and described by Shul'ts (as apetalous plants with only sepals in the flower), we shall limit ourselves to just a note on T. rossica, taking notice of points of interest in the above-mentioned work by Shul'ts.

Note. 2. In 1886, Krasnov collected plants in the Ili River valley; he determined them as Malcolmia contortuplicata var. taphrospermoides Krassnow. Due to the absence of mature fruits, it is difficult to establish the exact systematic position of this plant, although it is obviously related to the genus Torularia. The following is a brief description of M. contortuplicata var. taphrospermoides Krassnow (=Torularia taphrospermoides (Krassn.) Vass.?).

Annual, 30—40 cm tall, with long, thickened, retrorse branches and branched hairs; cauline leaves oblong, with broad petioles. Racemes long, spikelike; pedicels ca. 8—10 mm long; sepals oblong, pubescent, ca. 3 mm long, usually more or less violet-colored; petals 6 mm long, 2.5—3 mm broad, white, often bluish pink at the lower part; siliques (immature) 10—15 mm long, densely pubescent, with branched (and simple) hairs with a short fleshy style and capitate-bilobate stigma, more or less tuberculate; fruiting pedicels ca. 8—10 mm long.

1. Plant covered with glandular and simple hairs . . . . 11. **T. glandulosa** (Maxim.) Vass.
+ Plant covered with simple and branched hairs, not glandular . . . . 2.
2. Fruiting pedicels very short, 0.5—1 (1.5) mm long . . . . 3.
+ Fruiting pedicels longer . . . . 4.
3. Stem leafy, racemes more or less dense, many-flowered, siliques 1—1.2 mm broad . . . . 1. **T. torulosa** (Desf.) O. E. Schulz.

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* From the Latin torula — protuberance, bulge.

** Treatment by I. T. Vasil'chenko.

† [The Botanical Institute of the Academy of Sciences of the USSR.]

+ Stem usually leafless, racemes loose, few-flowered, siliques ca. 0.75 mm broad . . . . 7. **T. brevipes** (Kar. et Kir.) O. E. Schulz.
4. Stem (at least at the lower part) tomentose with dense and soft white hairs, cauline leaves pinnatipartite . . . . 10. **T. mollipila** (Maxim.) O. E. Schulz.
+ Plants different, no tomentose hairs . . . . 5.
61 5. Petals pink-purple . . . . 2. **T. contortuplicata** (Steph.) O. E. Schulz.
+ Petals white, yellow or bluish pink . . . . 6.
6. Petals bright yellow . . . . 4. **T. sulphurea** (Korsh.) O. E. Schulz.
+ Petals of another color . . . . 7.
7. Siliques appressed to stem, only the upper recurved, upper joint inflated . . . . 6. **T. adpressa** (Trautv.) O. E. Schulz.
+ Siliques more or less diverging from stem, upper joint not inflated . . . 8.
8. Fruiting pedicels ca. 2 mm long, siliques folded as a ring or spiral. Mountainous part of Turkmenia . . . . 5. **T. sumbarensis** (Lipsky) O. E. Schulz.
+ Silique pedicels 2–7 mm long (and longer), siliques straight or slightly curved . . . . 9.
9. Siliques 6–8 mm long, petals ca. 2 mm long . . . . 9. **T. brachycarpa** Vass.
+ Siliques (12) 15–30 (40) mm long, petals longer . . . . 10.
10. Petals 2.5–3.5 mm broad. Raceme ebracteate, fruiting pedicels thickened . . . . 3. **T. korolkovii** (Rgl. et Schmalh.) O. E. Schulz.
+ Petals 1.8–2 (2.5) mm broad. Raceme bracteate, fruiting pedicels thin . . . . 8. **T. humilis** (C. A. M.) O. E. Schulz.

Section 1. EU-TORULOSAE Vass. – Plants with branched and simple hairs.

1. **T. torulosa** (Desf.) O. Schulz, in Engler's Pflanzenr. IV, 105, 214. – Sisymbrium torulosum Desf., Fl. atlant. II (1798–1800) 84; DC., Prodr. I, 195; Boiss., Ann. Sc. Nat. Bot. 2 sér., XVII (1842) 74. – S. scorpiuroides Boiss., l. c. –S. rigidum M.B., Fl. taur. cauc. III (1819) 439; C. A. M., Verz. Pfl. Cauc. (1831) 190. – Malcolmia torulosa Boiss., Fl. Or. I (1867) 225; Shmal'g., Fl. I, 62. – M. cornuta Stapf in Denkschr. Akad. Wien, LI (1886) 32 p. p.; N. Busch, Fl. cauc. crit. III, 4, 643. – M. scorpiuroides Freyn in Bull. Herb. Boiss., 2 sér. III (1903) 688. – Ic.: Desf., l. c., tab. 159.

Annual plant, branching from base, 5–20 (30) cm high, stems prostrate or ascending, covered with branched and simple hairs or subglabrous; leaves narrowly oblong, with broad petioles, more or less emarginate-dentate to pinnatipartite; the upper leaves sublinear, remotely large-toothed or subentire, hardly petioles. Sepals oblong, obtuse, (1.5) 2 mm long; petals
62 white, linear-spatulate, obtuse at apex, 2.5–3 mm long, 0.6–0.8 mm broad; siliques cylindrical, sharply tuberculate, longitudinally grooved, straight or rather curved or bent as a ring or a spiral, 15–25 mm long, 1–1.25 mm broad, pubescent or glabrous, ascending, gray-green or gray-violet, with slightly elevated, pale, undulate lines, with short style and obtuse, somewhat capitate stigma; fruiting pedicels very short, ca. 1 mm long; seeds elliptic, 1–1.2 mm long, 0.5–0.6 mm broad, brown, glossy. March–April.

Clayey, solonetzic, and rocky steppes, also as a weed. – European part: Crim.; Caucasus: E. and S. Transc.; Centr. Asia: Ar.-Casp., Kara K. (oases), Mtn. Turkm., Amu D. Gen. distr.: Med., Bal.-As. Min., Iran. Described from Tunisia. Type in Paris.

2. **T. contortuplicata** (Steph.) O. Schulz in Engler's Pflanzenr. IV, 105 (1924) 219. — Malcolmia contortuplicata Boiss., Fl. Or. I (1867) 224; N. Busch, Fl. cauc. crit. III, 4 (1910) 639; Shmal'g., Fl. I, 62. — M. ledebouri Boiss., Fl. Or. I (1867) 224. — Cheiranthus contortuplicatus Steph. in Wild., Sp.pl. III, I (1800) 521. — Sisymbrium contortuplicatum DC., Prodr. I (1824) 195; Ldb., Fl. Ross. I, 183. — Ic.: Schulz. l. c.

Annual, 5—30 mm high, divaricately branching from base, branches ascending, covered with branched and simple hairs; leaves oblong, petioled, more or less emarginate-dentate to pinnatipartite or subentire. Sepals broad-oblong, 2—2.5 mm long; petals pink, 4—5 (8) mm long, 1.5—2 (3.5) mm broad, rounded or slightly emarginate at apex; siliques cylindrical, tuberculate, 20—30 (35) mm long, ca. 1.2 mm broad, pubescent or subglabrous, curved as a ring or spiral or straight, more or less curved with shining slightly elevated, longitudinal nerves on surface; stigma obtuse, somewhat capitate, subsessile; fruiting pedicels 3.5 and up to 8 mm long, clavate, usually thicker or as thick as siliques; seeds oblong, 1.2—1.5 mm long, 0.5—0.6 mm broad. March—April.

Clayey, solonetzic, and rocky steppes in the Transcaspian area. — European part: L. V.; Caucasus: Cisc., Dag., E. Transc., Tal.: Centr. Asia: Ar.-Casp., Mtn. Turkm. Endemic. Described from Transcaucasia. Type in Berlin.

Note. Included within the range of this species is var. ledebouri (Boiss.) O. E. Schulz (Malcolmia ledebouri Boiss.), which is distinguished by broader petals (up to 2.5—3.5 mm) and runcinate pinnatipartite leaves.

3. **T. korolkovi** (Rgl. et Schmalh.). O. Schulz in Engler's Pflanzenr., IV, 105 (1924) 220. — Sisymbrium (Arabidopsis) korolkowi Rgl. et
63 Schmalh. in A. H. P. V, 1 (1877) 240; Lipsk., A. H. P. XXIII, 1 (1904) 23. — Malcolmia mongolica Maxim. in Bull. Acad. Pét. XXVI (1880) 122. — Sisymbrium mongolicum Maxim., Enum. pl. Mongol. I (1889) 61.

Annual, biennial, or perennial, (8) 10—20 (30) cm high, usually with more or less numerous stems ascending from the rootstock, densely pubescent with soft, branched and often simple spreading hairs; leaves oblong, obtuse; radical leaves numerous, large, long-petioled, cauline leaves smaller, subsessile, sparsely remotely denticulate along margin. Sepals oblong, 2—3 mm long; petals 4—6 mm long, 2.5—3.5 mm broad, slightly emarginate at apex, white, sometimes pinkish at the lower part, obovate; siliques at lower part more or less appressed to stem, curved or bent as a ring, covered with thick, branched hairs, with a short (up to 0.5 mm) fleshy style (in var. longistyla Vass. style up to 1—1.5 mm long) and an obtuse, bilobate stigma; fruiting pedicels 5—7 mm long, clavate at apex, 15—18 mm long, ca. 1 mm broad. June—August.

Mountainous areas; slopes, rocky and sandy valleys. — Centr. Asia: Mtn. Turkm., Syr D., T. Sh., Pam.-Al. Gen. distr.: Dzu.-Kash., Mong. Description based upon specimens collected by Korol'kov in the area of the Tolun Pass and the Ottuk Gorge (Tien Shan). Type in Leningrad.

Note. There are within this species annual (biennial?) and perennial forms, slightly pubescent, with glabrous fruit; there is as yet a lack of material on these forms. The species is related to the two preceding ones.

4. **T. sulphurea** (Korsh.) O.Schulz, Engler's Pflanzenr. IV, 105 (1924) 221. — Sisymbrium sulphureum Korsh. in Bull. Acad. Pét., 5 sér. IX, 5 (1898) 410; O. Fedtsch. in A. H. P. XXI (1903) 272.

Perennial, usually with numerous stems ascending from the rootstock, 10—20 (30) cm high, covered with thick, branched hairs; leaves oblong, the radical numerous, long-petioled, obtuse, entire or with somewhat obtuse, sparse denticles, cauline leaves smaller, sessile, few. Racemes dense, capitate, leafless, elongating in fruit, flowering pedicels equal to or exceeding the calyx. Sepals ca. 2.5 mm long, more or less violet-colored, oblong, obtuse, subglabrous, scarious along the margin; petals 4.5—5 (6) mm long, 2.5—3.5 mm broad, sulfur-yellow, tapering below, usually slightly violet; siliques linear, cylindrical, somewhat flattened, 10—20 mm long, ca. 1.2 mm broad, tuberculate, bent or folded in a ring, with dense branched hairs, style slightly fleshy, 0.5—0.75 mm long, stigma small, obtuse; fruiting pedicels thin, appressed to axis, 4—7 mm long, clavate at apex. June—July. (Plate IV, Figure 1). 64

High mountainous areas; rocky, sandy, and solonetzic depressions and valleys, slopes, up to 4,300 m above sea level. — Centr. Asia: Pam.-Al., T. Sh. **Gen. distr.**: Dzu.-Kash. Described from Pam.-Al. (in the area of Kara-Kul Lake and Rang-Kul. Type in Leningrad.

Note. It is possible that within the range of this species there are annual (biennial?), as well as perennial forms.

5. **T. sumbarensis** (Lipsky) O. Schulz, in Engler's Pflanzenr. IV, 105 (1924) 221. — Sisymbrium sumbarense Lipsk. in A. H. P. XXVI, 2 (1910) 120.

Annual, (10) 20—30 cm high, branching from base, with long slender, retrorse branches covered with bipartite, appressed hairs and scattered, simple spreading hairs; lower leaves oblong-oblanceolate, cauline leaves linear, all petioled, entire or sparsely denticulate along margin. Sepals oval, pubescent, 1.5 mm long; petals 3 mm long, bluish pink; siliques cylindrical, somewhat flattened, tuberculate, 15—20 mm long, ca. 1 mm broad, bent to a ring or spirally curled, covered with silkish, appressed, short, bipartite hairs; fruiting pedicels ca. 2 mm long, cylindrical, slightly broadening at apex, nearly as thick as siliques; stigma obtuse, style short, fleshy; seeds oblong, 1.2 mm long. March—April (?). (Plate IV, Figure 3).

Stony river valleys. — Centr. Asia: Mtn. Turkm. Described from the mountainous part of Turkmenistan (from the Sumbar River, a tributary of the Atrek River). Type in Leningrad.

6. **T. adpressa** (Trautv.) O. Schulz, in Engler's Pflanzenr. IV, 105, 221. — Sisymbrium adpressum Trautv. in A. H. P. IX, I (1884) 367 et IX, 2 (1886) 440 (non Turcz.). — S. trautvetteri Lipsky, A. H. P. XXVI, 2 (1910) 119. — Malcolmia torulosa var. contortuplicata O. Ktz., A. H. P. X, I (1887) 167.

Annual, 15—40 cm high, branching from base, with long, slender, retrorse branches, often bluish (especially in the lower part); radical leaves oblong-obovate, obtuse, more or less dentate to lyrate pinnatipartite, cauline leaves narrowly oval, obtuse, with sparsely denticulate or entire, densely pubescent, with appressed, branched hairs, and among them simple hairs. Racemes markedly elongated after flowering. Sepals oblong, pubescent, 2.2 mm long; petals tapering at base, abruptly broadening toward apex, white at the beginning later becoming pink, 4 (5) mm long, 1.8–2 mm broad; siliques greenish or dingy violet, appressed to stem, only the apexes recurved and often folded to a ring, cylindrical, flattened, densely covered with soft, 65 branched hairs, few-seeded (5–16), usually thickened and slightly inflated around upper seeds, (10) 15–20 (25) mm long, 1–1.5 mm broad, tuberculate; fruiting pedicels thickened, 2–3 (5) mm long; stigma obtuse, somewhat capitate, obscurely bilobate, style short and fleshy; seeds oblong-elliptic, ca. 1.8–2 mm long, ca. 1 mm broad, brownish or olive, shining. March–April. (Plate IV, Figure 2).

Slopes, dry valleys. – Centr. Asia: Mtn. Turkm. Gen. distr.: Afghanistan. Described from Mtn. Turkm., based on Becker's collections from Kyzyl-Arvat. Type in Leningrad.

7. **T. brevipes** (Kar. et Kir.) O. Schulz in Engler's Pflanzenr. IV, 105 (1924) 222. – Sisymbrium brevipes Kar. et Kir. in Bull. Soc. nat. Mosc. XV, 1 (1842) 154, No.106 et Sisymbrium sp. indet. ibid. (1841) 383 p. p. excl. var. siliquis contortuplicatis.

Annual, 5–12 cm high, usually with numerous, slender, subfiliform and erect stems, covered with branched hairs; leaves mostly radical, oblong-obovate, broad-petioled, obtuse. Racemes very loose, 2–10-flowered, pedicels very short, ca. 1 mm long; sepals elliptic, 1.2–1.5 mm long; petals white, 2.5 mm long, linear-cuneate; fruiting pedicels ca. 1–1.5 mm long; siliques erect, 10–20 mm long, ca. 0.8 mm broad, with obtuse stigma, partly dehiscent at maturity, slender-cylindrical, more or less tuberculate, gray-green, often somewhat spirally curved at apex, valves obtuse at both ends, pubescent or glabrous; seeds oblong, flattened, brown, smooth, ca. 1 mm long. May.

In sands, stony river valleys. – Centr. Asia: Balkh. Endemic. Description based upon specimens collected by Karelin and Kirillov in 1841 on sands near the Ayaguz River (northwest of Lake Balkhash, No. 106). Type in Leningrad.

8. **T. humilis** (C. A. M.) O. Schulz in Engler's Pflanzenr. IV, 105 (1924) 223; N. Busch, Fl. Sib. et Or. Extr. 6, 590; Kryl., Fl. Zap. Sib. VI, 1343. – Sisymbrium humile C. A. M. ap. Ldb., Ic. pl. ross. II (1830) 16 et Ldb., Fl. Ross. I, 184; Rgl. in Bull. Soc. nat. Mosc. XXXIV, 3 (1861) 204. – S. nanum var. humile Trautv. in A. H. P. V (1877) 25. – Ic.: N. Busch, l. c., 591 et tab. geogr. 593.

Annual, biennial, or perennial, usually with ascending slender stems, 15–30 cm high, covered (mainly at the lower part) with finely branched and spreading, simple hairs (or subglabrous); radical leaves oblong, obtuse, more or less emarginate-dentate to pinnatipartite, petioled, cauline leaves oblong-linear, sparsely denticulate to subentire. Sepals oblong, obtuse, 66 2 (2.5) mm long; petals white at the beginning (then bluish), (3) 4–5 mm long, 1.8–2.2 (2.5) mm broad; siliques linear, somewhat flattened, cylindrical, straight or slightly curved, (15) 20–30 (35) mm long, 1–1.2 mm broad, finely pubescent or glabrous, with short (0.5 mm) fleshy style and capitate, obtuse, bilobate stigma; fruiting pedicels 4–6 mm long, thinner than siliques; seeds oblong, shining, brown, ca. 1 mm long. May–July.

Stony and dry, clayey places, river valleys. – W. Siberia: Alt.; E. Siberia: Lena-Kol., Ang.-Say.; Centr. Asia; T. Sh., Pam.-Al. Gen. distr.: Mong., N. and Arc. Am. Described from Altai. Type in Leningrad.

Note. Shul'ts (l. c.) treated T. humilis as a perennial; N. A. Bush (l. c.) notes the presence of both perennial and biennial forms within this species. Shul'ts described separately prol. piasezkii (Maxim.) O. E. Schulz (Sisymbrium piasezkii Maxim.), with stems branching from base and siliques 8–13 mm long, usually more or less thin, curved.

9. **T. brachycarpa** Vass. in Addenda VII, p. 472.

Perennial, 2–8 cm high, prostrate, branching from base; branches numerous, slender, reddish, leafy, with finely branched hairs; leaves oblong, numerous, small, the lower 1.5–2 cm long (incl. petioles), cauline leaves 0.7–1 cm, pinnatipartite into few, small, lanceolate lobes. Racemes short, dense, capitate, leafy; sepals pilose, ovate, 1.2–1.5 mm long; petals bluish pink, 2–2.5 mm long; siliques cylindrical, thickened, 6–8 mm long, 1–1.2 mm broad, densely covered with minute hairs; style fleshy, inconspicuous, stigma subsessile, minute; fruiting pedicels pilose, thin, 2–3 mm long. July–August.

River valleys. – Centr. Asia: Pam.-Al. Endemic. (?). Description based on specimen collected by Alekseenko in the Pamirs (ca. 3,500–4,000 m) near the Akbaital River, a tributary of the Murgab River. Type in Leningrad.

10. **T. mollipila** (Maxim.) O. E. Schulz in Engler's Pflanzenr. IV, 105 (1924) 217. – Sisymbrium mollipilum Maxim., Fl. tang. (1889) 62. – Ic.: Maxim., l. c.

Annual or biennial, (5) 15–25 (30) cm high; stem branching from base, branches ascending, densely covered with branched hairs (among which are also simple hairs), white-tomentose at the lower part, often less dense
69 toward apex; leaves long, narrowly oblong, pinnatilobate or pinnatipartite into lanceolate or linear-lanceolate lobes, the lower petioled, the upper subsessile. Racemes short, dense; sepals pilose, 2.5–3 mm long; petals bluish-pink, 3.5–4 mm long; fruiting pedicels appressed to stem, ca. 2–3 mm long; fruit cylindrical, finely and densely pilose, erect, 20–45 mm long, 1–1.2 mm broad, style very short, fleshy, stigma small, capitate; seeds yellowish brown, 1 mm long, 0.5 mm broad, elliptic, convex at one side. July–August. (Plate IV, Figure 4).

Stony and clayey slopes. – Centr. Asia: T. Sh., Pam.-Al. Gen. distr.: Dzu.-Kash., Tib. Described from the Nan-shan Range (3,500 m) in northeast Tibet. Type in Leningrad.

Section 2. GLANDULOSAE Vass. – Plants covered with glandular and simple hairs.

11. **T. glandulosa** (Kar. et Kir.) Vass. comb. nova. – Sisymbrium glandulosum Maxim., Fl. Tang. I (1889) 61. – Arabis glandulosa Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 146. – A. tibetica Henders. and Hum., Lahore to Yarkand (1873) 310.

Annual (?), 5–15 (25) cm high; stem erect, branching from base, frequently with prostrate or ascending branches, covered with many small glands; leaves rather numerous, oblong, the lower emarginate-dentate to remotely pinnatipartite, into a few 2–3-paired, narrowly lanceolate, lateral lobes, and a longer apical lobe, sparsely covered with simple hairs, the upper

(67)

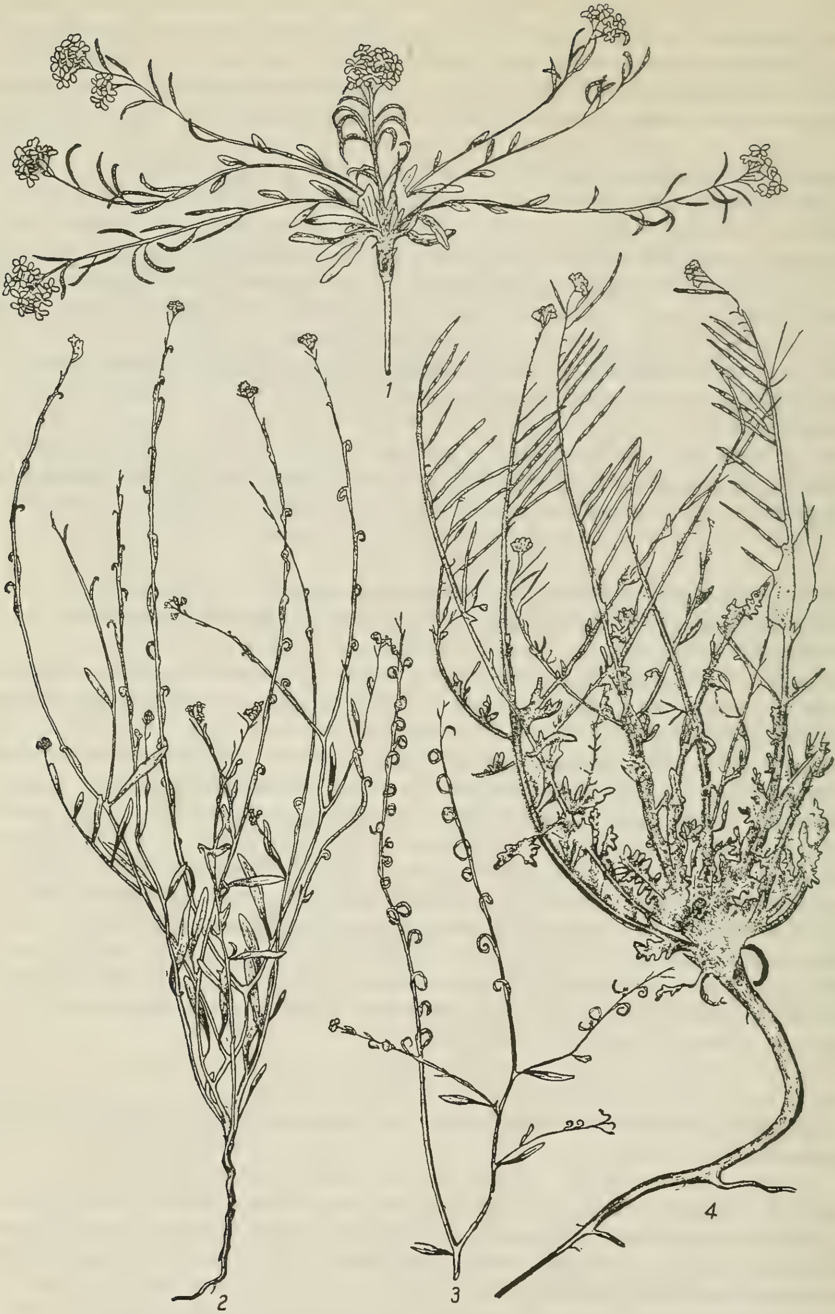

PLATE IV. 1 – Torularia sulphurea (Korsh.) Schulz; 2 – T. adpressa (Trautv.) Schulz; 3 – T. sumbarensis (Lipsky) Schulz; 4 – T. mollipila (Maxim.) Schulz.

leaves small, entire or denticulate. Sepals ca. 3 mm long, 4–5 mm wide, bluish pink or pale pink; siliques 15–20 (30) mm long, 1 mm broad, covered with retrorse glands, numerous, with short fleshy style; fruiting pedicels 5–8 mm long; seeds 1 mm long, 0.8 mm broad. June–July.

High-mountain steppes, banks of rivers and lakes, stony and clayey slopes, up to 4,000–4,500 m. – Centr. Asia: T. Sh., Pam.-Al. Gen. distr.: Dzu.-Kash., Tib. Described from Tibet. Type in Leningrad.

Note. Var. pamirica Vass., distinguished by its longer siliques (20–30 mm long), is found in the Pamirs.

Genus 575. **BRAYA*** STERNB. et HOPPE**

Sternb. et Hoppe in Denkschr. Bot. Gesellsch. Regensb. I (1815) 65 et ap. Dc., Syst. II (1821) 210.

Sepals divergent, not saccate. Petals pink-bluish or white, sometimes 70 yellowish. Filaments edentate, free. A small, short-pyramidal nectariferous gland on each side of the shorter stamens. Ovary sessile. Style very short, stigma shortly bilobate. Fruit a short, linear or oblong silique or a globose, ovate silicle. Septum with a strand and many (stout) parallel walls of the epidermal cells. Seeds biseriate, cotyledons flat, embryo notorrhizal. – Small plants of the Arctic and the high mountains (alps) of Asia, perennials with branched and simple hairs.

1. Fruit a linear silique, 10–15 mm long, ca. 1 mm broad . . . . 1. **B. siliquosa** Bge.
+ Fruit shorter and broader . . . . 2.
2. Fruit an ovate-spheroid silicle, nearly as long as broad . . . . 4. **B. brachycarpa** Vass.
+ Fruit an oblong-ovate or linear silique, several times longer than broad . . . . 3.
3. Leaves subfiliform, capillary when dried . . . . 7. **B. angustifolia** (N. Busch) Vass.
+ Leaves broader . . . . 4.
4. Siliques short, 3.5–4.5 (5) mm in length, 1.8–2 mm broad, densely pubescent. Racemes leafy . . . . . . 3. **B. scharnhorsti** Rgl. et Schmalh.
+ Siliques longer, racemes leafless or 1–2-leaved . . . . 5.
5. Siliques 7–10 mm long, 2–3 mm broad, violet. Arctic . . . . 8. **B. purpurascens** (R. Br.) Bge.
+ Siliques smaller in size, petals smaller . . . . 6.
6. Petals yellowish. Siliques densely pilose, pedicels 6–8 mm long . . . . 2. **B. pamirica** (Korsh.) B. Fedtsch.
+ Petals bluish pink, rarely white . . . . 7.
7. Racemes leafless . . . . 8.
+ Racemes leafy [sic] . . . . 9. **B. oxycarpa** Hook. f. et Thoms.
8. Siliques 1.5–2 mm broad . . . . 6. **B. rosea** (Turcz.) Bge.
+ Siliques 1.2 mm broad . . . . 7. **B. aënea** Bge.

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* After F. G. Bray (1765–1832), head of the Botanical Society in Regensburg.

** Treatment by I. T. Vasil'chenko.

Note. Bunge (Del. sem. H. Dorp. 1841, 8) described B. limosella, distinguished by its low stature (ca. 1.5 cm), leaves overtopping the flower scapes, siliques small, and several other characteristics. The only specimen of this plant, preserved in the Herbarium of the Botanical Institute of the Academy of Sciences, actually represents one of the (numerous) low-growing strains of B. rosea or B. aënea. Until more material on 71 B. limosella is available, I limit myself to comments on this species; for details see the works of N. A. Bush (Fl. Sib. i Dal'n. Vost. VI (1931), pp. 585–586 with illustration), Krylov (Fl. Zap. Sib. VI (1931) 1376), and also the monograph by Shul'ts (O. E. Schulz in Engler's Pflanzenreich, IV, 105 (1924) 237) and others.

1. **B. siliquosa** Bge., Del. sem. H. Dorp. (1839) 7 et Ann. Sc. Nat. Bot., 2 sér. XVIII (1842) 223; Ldb., Fl. Ross. I, 195; N. Busch, Fl. Sib. et Or. Extr. 6, 576; Kryl., Fl. Zap. Sib. VI, 1376; O. E. Schulz in Engler's Pflanzenr. IV, 105, 531. – B. alpina Ldb., Fl. Ross. I (1842) 195. – B. versicolor Turcz., Fl. baic.-dah. I (1842) 281. – Ic.: N. Busch, l. c., 577 et tab. geogr. 587.

Perennial, (3) 7–15 (20) cm high; stems leafless (rarely 1–3-leafed), with bipartite and simple hairs; radical leaves numerous, oblong-linear, entire or remotely denticulate, covered with branched and simple hairs. Racemes short; sepals 2–2.5 (3) mm long; petals 3–4 (5) mm long, white, later bluish pink; pedicels 2–4 times as long as calyx; siliques linear, somewhat flattened, pilose or glabrous (var. tilingi (Rgl.) O. E. Schulz), (8) 10–15 (18) mm long, ca. 1 mm broad; style fleshy, ca. 1 mm long, stigma small, capitate, slightly bilobate; seeds reddish brown, acute and prominent at the radicle-apex, 0.75 mm long, 0.4–0.5 mm broad. July–August.

Alpine region, meadows, slopes. – W. Siberia: Alt.; E. Siberia: Lena-Kol., Dau.; Far East: Okh. **Gen. distr.**: N. Am. (52–57°N. lat.). Described from Altai, from the Chuya belki* near the Tobozhok Mountain stream. Type in Leningrad.

2. **B. pamirica** (Korsh.) O. Fedtsch. in A. H. P. XXI (1903) 280. – B. Thomsoni var. pamirica O. E. Schulz in Engler's Pflanzenr. IV, 105 (1924) 230. – Erysimum pamiricum Korsh. Plants of Turkestan (1896) 88.

Perennial, 5–15 cm high, many-stemmed, with small, dense, branched hairs; leaves mostly radical, the cauline few, linear, but somewhat broadened toward apex, forming dense tufts, together with remnants of older leaves. Racemes dense, capitate, elongating in fruit; sepals 2–2.5 mm long; petals 4–5 mm long, yellow (often bluish pink at base); siliques cylindrical, tuberculate, 6–8 mm long, ca. 1–1.2 mm broad, densely pubescent, with short fleshy (0.5 mm long) style, more or less curved; fruiting pedicels 6–8 (10) mm long; seeds oblong, brown, 1.5 mm long, 0.5 mm broad. July–August.

Stony and sandy places, sometimes in the "red clays" of the Pamirs, 5,000 m. – Centr. Asia: Pam.-Al. Endemic. Described from Pamir-Alai, near the Ui-Bulak River. Type in Leningrad.

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3. **B. scharnhorsti** Rgl. et Schmalh. in A. H. P. V (1877) 241. – B. oxycarpa var. scharnhorsti O. E. Schulz in Engler's Pflanzenr. IV, 105, 237. – Beketowia tian-schanica Krassn., Zap. Russk. Geogr. Ob-va (1888) 335.

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* [Belki – snow-capped mountains.]

Perennial, 3–5 (8) cm high, with many stems ascending from dense tufts, formed by numerous, radical leaves with their remnants; leaves linear, slightly broadening toward apex, covered with sparse hairs. Scapes few-leaved, densely covered with branched and simple hairs; racemes short, more or less oval; sepals ovate, more or less pilose to subglabrous, usually violet, scarious along margin, ca. 1.8–2.2 mm long; petals 3–3.5 mm long, yellowish, sometimes mauve at base; siliques oblong-ovate, 3.5–4.5 (5) mm long, 1.8–2 mm broad, densely pubescent, with fleshy style 0.5–1 mm long; fruiting pedicels thin, 3–5 mm long; seeds short-elliptic, 0.75 mm long, 0.5 mm broad. June–July.

Solonetzic mountainous deserts. – Centr. Asia: T. Sh. Endemic. Description based on Scharnhorst collections (July 1872) from Tien Shan. Type in Leningrad.

4. **B. brachycarpa** Vass. sp. nova in Addenda VII, p. 473.

Perennial, 5–6 cm high, many-stemmed; leaves numerous, the radical linear, broadening somewhat toward apex, glabrous, more or less pilose at base (along petioles). Scapes leafless, sometimes with only one leaf at the base of the short capitate racemes. Sepals elliptic, somewhat pilose, 2 mm long, narrowly scarious along margin; petals 2.5–3 mm long, pale (their color is impossible to determine in herbaria); fruit numerous, congested, spheroid-ovoid, 2–2.5 mm long, ca. 2 mm broad, with a short, fleshy style (ca. 0.5 mm long) and an indistinct stigma, pale or slightly violet, glabrous to subglabrous; fruiting pedicels 2.5–3 mm long, densely pilose (as on the scapes).

Centr. Asia: Pam.-Al. Endemic. Described from the Pamirs, where it was collected on wet sand near the Muskol River. Type in Leningrad.

5. **B. rosea** (Turcz.) Bge., Del. sem. H. Dorp. (1839) 7; Ldb., Fl. Ross, I, 195; N. Busch, Fl. Sib. et Or. Extr. VI, 581; Kryl., Fl. Zap. Sib. VI, 1375; O. E. Schulz in Engler's Pflanzenr. IV, 105, 231 pp. – Draba rosea Turcz., Cat. in Bull. Soc. nat. Mosc. (1838) 87. – Sisymbrium alpinum var. roseum Trautv. in A. H. P. I, 1 (1871) 59. – Ic.: O. E. Schulz, l. c.; N. Busch, l. c., 582 et tab. geogr. 583.

Perennial, 2–5 (8) cm high, many-stemmed, densely cespitose; leaves
73 mainly radical, narrowly oblong-obovate, numerous, glabrous or beset with hairs (especially along petioles). Racemes thick, short, somewhat capitate, scapes leafless, densely covered with short branched and simple hairs, or subglabrous, often reddish-colored; sepals frequently dark bluish, narrowly scarious along margin, 2.5 mm long, minutely pilose, petals bluish pink or whitish (var. albiflora Max.), to 3 (5) mm long; siliques oblong, slightly ovate, 6–7 mm long, 1.5–1.8–2 mm broad, finely pilose or subglabrous, more or less violet-colored, with style pale, fleshy, ca. 0.5–1 mm long; seeds ovate, yellowish-brownish, ca. 0.8 mm long. June–August. (Plate XVIII, Figure 2).

Stony valleys of mountain rivers, glacial moraines, taluses, wastes and slopes. – W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: T. Sh., Pam.-Al. (very rare). Gen. distr.: Mong., Dzu.-Kash., Tib. Described from Dauria, Nukhu-Daban District. Type in Leningrad.

Note. This species is weakly isolated from the following (B. aenea Bge.).

6. **B. aënea** Bge., Del. sem. Hort. Dorpat. (1841) 8 et in Ann. Sc. Nat. Bot., 2 sér., XVIII (1842) 221; N. Busch, Fl. Sib. et Or. Extr. 6, 578; Kryl., Fl. Zap. Sib. VI, 1374; O. E. Schulz in Engler's Pflanzenr. IV, 105 (1924) 232. — Sisymbrium alpinum var. aënea Trautv. in A. H. P. V (1877) 26. — Ic.: N. Busch, l. c., 579 et tab. geogr. 580; Trautv., Pl. imag. (1844) 32, tab. 22. — Exs.: HFR No. 1105.

Perennial; stems suberect, slender, 4—10 (15) cm high, covered with bipartite hairs or glabrous, coppery red-violet* (like leaves); leaves only radical (sometimes 1—3 short leaves on stem), narrowly linear or narrowly oblong-linear, entire or remotely denticulate. Racemes short, dense; sepals 2—2.5 mm long, ovate, violet, white-scarious along margin; petals 3—3.5 mm long, bluish pink, sometimes whitish; siliques oblong, slightly ovate, 5—8 mm long, 1.2 mm broad, glabrous; style 0.5—0.75 mm long; seeds grayish brown, 0.8 mm long, 0.4 mm broad. July—August.

Stony valleys of mountain rivers, rock streams, slopes, moraines. — Arctic: Arc. Sib.; W. Siberia: Alt.; E. Siberia: Yenis., Ang.-Say., Dau., Lena-Kol.; Centr. Asia: Pam.-Al. Gen. distr.: Tib. Described from Altai, from the region of the Chuya and Argut rivers. Type in Leningrad.

7. **B. angustifolia** (N. Busch) Vass. sp. nova in Addenda VII, p. 473. — B. rosea var. angustifolia N. Busch, Fl. Sib. et Or. Extr. 6 (1931) 583.

Perennial, 2—5 cm high, with many slender, usually reddish stems, 74 sparsely pubescent with scattered hairs; leaves numerous, the radical narrowly linear to subfiliform, capillary when dry, resembling leaves of sheep's fescue (Festuca ovina), remotely denticulate. Racemes small, short, capitate; sepals dark violet, glabrous or slightly pubescent, 1.5 mm long; petals bluish pink, 2.5—3 mm long; fruiting pedicels 2—3 mm long; siliques glabrous, 3—4 (5) mm long, 1.2—1.5 mm broad, oblong, slightly ovate, with a small style. May—June.

E. Siberia: Ang.-Say. Endemic. Description based on specimen [collected] by V. L. Komarov from Koimar Arshan in Tunkinskie Gol'tsy area. Type in Leningrad.

8. **B. purpurascens** (R. Br.) Bge. in Ldb., Fl. Ross. I (1842) 195; N. Busch, Fl. Sib. et Or. Extr. VI, 584; O. E. Schulz in Engler's Pflanzenr. IV, 105, 233. — B. glabella Bge., Del. Sem. Hort. Dorpat. (1841) 8. — Sisymbrium alpinum var. glabella Trautv. in A. H. P. I (1871) 59. — Platypetalum purpurascens R. Br., Chloris Melvill. (1823) 9. — Ic.: N. Busch, l. c., 585; O. E. Schulz, l. c.

Perennial, 2—5 mm high (to 10—15 mm in fruit), with many relatively robust stems, more or less reddish; leaves mostly radical, oblong-linear, entire or remotely denticulate, covered with simple and branched hairs along margin; scapes leafless (or with one leaf), densely hairy with simple and branched hairs. Racemes short, ovate, elongating in fruit, one or two of the lower flowers often markedly separated below from inflorescence; sepals 2—3 mm long, often bluish-reddish in color; petals 3.5—4 (5) mm long, bluish pink; siliques oblong, slightly ovate, 7—10 mm long, 2—3 mm broad, more or less violet, with small sparse hairs; style ca. 0.75 mm long; seeds oblong, somewhat ovate, 1—1.2 mm long, ca. 0.5 mm broad. July—August.

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* Similar color occurs in other species of Braya (I.V.).

River valleys, stony coastlines, slopes. — Arctic: Arc. Eur., Nov. Z., Arc. Sib. **Gen. distr.:** N. Am. (Arctic part), Greenland and other islands of the Arctic Ocean. Described from North America (Melville Island).

9. **B. oxycarpa** Hook f. et Thoms., Journ. Linn. Soc. Bot. V (1861) 169; O. E. Schulz in Engler's Pflanzenr. IV, 105 (1924) excl. var. Scharnhorstii O. E. Schulz. — B. rubicunda Franchet in Bull. Soc. Bot. Fr. XXXIII (1886) 403. — Eutrema ? Przewalskii Maxim., Fl. tang. I (1889) 68. — Ic.: Maxim., l. c.

Perennial; stems 2—5 (7) cm high, simple, covered with simple and branched hairs or glabrous (f. glabra Vass.), leafy, usually more or less purple; leaves radical, narrowly oblong-spatulate, elongate but small, obtuse, entire, the upper oblong, all glabrous or sparsely hairy. Raceme 75 bracteate, loose; sepals 2 mm long, glabrous; petals 4—5 mm long, white or pinkish, obovate, tapering below; siliques glabrous, lanceolate, 5—8 mm long, 1.5—2 mm broad, elongated at apex, with slender style ca. 0.75 mm long; fruiting pedicels 3—6 mm long. July.

High mountainous areas, banks of rivers and lakes, wet meadows — from 3,500 to 5,600 m. — Centr. Asia: Pam.-Al. (eastern Pamirs). **Gen. distr.:** Dzu.-Kash., Tib. Described from Tibet. Type in London.

Note. The glabrous form of this species is the only one found in the USSR (f. glabra Vass.).

Genus 576. **THELLUNGIELLA*** O. E. SCHULZ**

O.E.Schulz in Pflanzenreich H.86 (1924) 251.

Sepals ascending, equal. Petals white, obovate, few-nerved, tapering into a short claw. Filaments edentate. Two lateral nectariferous glands outside each of the short stamens, semispheroidal. Median glands absent. Ovary sessile, with 54 ovules. Stigma flattened, capitate, slightly bilobate. Silique linear, very short. Valves 1-nerved. Style inconspicuous. Septum hyaline, shiny, 1-nerved or nerveless. Seeds many, very small, ovate, yellowish brown, dotted-striate under magnification. Cotyledons linear. Embryo notorrhizal. — Annuals or biennials, small, completely glabrous, glaucescent, with small flowers and filiform pedicels.

Two species growing on solonetzic soil in Siberia, Mongolia, and northwestern America.

1. Radical leaves obscurely emarginate-dentate, cauline leaves distinctly auricled . . . . 1. **T. salsuginea** (Pall.) Schulz.
+ Many of the radical leaves emarginate bipartite, cauline leaves indistinctly auricled . . . . 2. **T. halophila** (C. A. M.) Schulz.

1. **T. salsuginea** (Pall.) Schulz in Pflzr. H. 86 (1924) 252 cum ic.; N. Busch, Fl. Sib. et Or. Extr. 4 (1926) 408; Kryl., Fl. Zap. Sib. VI, 1342. — Sisymbrium salsugineum Pall., Reise II (1773) Anhang 46. — Turritis salsuginosa DC., Syst. II (1821) 212. — Ic.: Pall., Reise II (1773) tab. V (sub S. salsugineo); N. Busch, l. c., 408 et tab. geogr. 410.

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* After the botanist Thellung.

** Treatment by N. A. Bush.

Annual or biennial; stem erect, 3–42 cm high, flexuous, densely leafed, more or less branching, sometimes from base; radical leaves subrosulate, marcescent at flowering, obovate, rounded at apex, entire or obscurely eroded-dentate, petioled; the lower cauline leaves sessile, oblong-ovate, 76 obtuse, entire, amplexicaul, 2-auricled at base, the upper subacute, deeply cordate, amplexicaul with rounded auricles. Raceme corymbose-compressed, subanthesis, later elongated, 12–50-flowered; sepals 1.5–2 mm long, with broad hyaline rim; petals white, oblong, 2–3.5 mm long; pedicels slender, spreading, in fruit 4–9 mm long; siliques 1–2 cm long, 0.75–1 mm broad, slightly curved, ascending; seeds reddish brown, 0.5–0.6 mm long, 0.3–0.4 mm broad, 0.25 mm thick. Fl. May–July. Ripe Fr. July–August.

Solonetzes, solonchaks, and solonetzic meadows. — W. Siberia: Irt., Alt., Ob; E. Siberia: Dau., Yenis., Ang.-Say., Lena-Kol.; Centr. Asia: Balkh. **Gen. distr.:** Mong., N. Ch. Described from the banks of the salt lakes in Irtysh and from the Baikal area. Type in Leningrad.

2. **T. halophila** (C. A. M.) Schulz in Pflzr. H. 86 (1924) 253; N. Busch, Fl. Sib. et Or. Extr. 4 (1926) 411; Kryl., Fl. Zap. Sib. VI, 1342. — Sisymbrium halophilum C. A. M. in Ldb., Fl. Alt. III (1831) 143. — Ic.: Ldb., Ic. pl. ross. tab. 270; N. Busch, l. c., 412–413 et tab. geogr. 413.

Annual or biennial; stem always branching from base, 10–15 cm high; radical leaves rosulate, petioled, not marcescent at flowering, narrowly obovate, mostly deeply serrate or emarginate, pinnatifid, some entire; cauline leaves oblong, entire, sessile, semiamplexicaul, with or often without small auricles. Sepals 1.5 mm long; petals 3 mm long, oblong, white; pedicels filiform, 3.5–6 mm long in fruit; siliques 7–16 mm long, 0.75 mm broad. Fl. end of July.

Moist, muddy, solonetzic places along the Irtysh River. W. Siberia: Irt. Endemic. Described from the Dzungarian semidesert near the Irtysh River. Type in Leningrad.

Genus 577. **ARABIDOPSIS*** HEYNH.**

Heynh. in Holl et Heynh., Fl. Sachs. I (1842) 538. — Sisymbrium sect. Arabidopsis Fourn., Recherch. Crucif. (1865) 98 (part.). — Stenophragma Čelak., Kvet., Ok. Prazs. (1870) 75 et in Flora LV, 28 (1872) 438–442 et Pr. Boehm., III (1875) 445.

Sepals more or less erect, subequal. Petals white or straw-colored. Filaments edentate. Lateral nectariferous glands semicircular or ring-shaped, very rarely (in A. thaliana) semispheroidal, in front of the shorter stamens, the median tuberculate, often with 2 projections connate with the lateral. Ovary sessile or (in A. toxophylla) with a short stalk 77 (gynophore), many (20–72)-ovuled. Stigma flattened-capitate, rarely subbilobate. Fruit a bivalved dehiscent silique, linear, subcylindrical. Valves 1-nerved, with netted lateral veins. Style short, stoutish. Septum shiny, generally 1-nerved. Seeds in 1, rarely 2 rows, ovate, brown, nearly smooth. Cotyledons broadly oblong. Embryo notorrhizal. Annual or perennial plants, resembling Arabis.

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* From Arabis and Greek opsis — species.

** Treatment by N. A. Bush.

A genus of 13 species, distributed in the temperate countries of the Northern Hemisphere; 5 of which grow in the Soviet Union.

The genus Arabidopsis is of Central Asian origin. Most of the species of this genus grow in Central Asia and in the nontropical part of the Himalayas.

The species of Arabidopsis are generally xerophytes; some are halophytes, and others are from stony places and rocks, etc.

1. All leaves radical. Stem, including flowering raceme and petals, 1.5–9 cm high . . . . 6. **A. verna** (C. Koch) N. Busch.
+ Leaves radical and cauline. Stems much higher . . . . 2.
2. Cauline leaves amplexicaul, exauricular, sometimes even short-petioled, entire . . . . 3.
+ Cauline leaves amplexicaul, auricular . . . . 4.
3. Plant completely glabrous, apetalous, siliques obtuse . . . . 2. **A. parvula** (Schrenk) Schulz.
+ Plant pubescent, petals present, siliques subacute . . . . 1. **A. thaliana** (L.) Heynh.
4. Siliques softly pubescent. Flowers straw-colored. Petals 2.5–3.5 mm long . . . . 3. **A. pumila** (Steph.) N. Busch.
+ Siliques glabrous. Flowers white . . . . 5.
5. Lower part of stem and lower leaves covered with short stellate downy hairs. Petals 5–7 mm long . . . . 4. **A. toxophylla** (M. B.) N. Busch.
+ Plant long-hairy throughout. Petals 3–4 mm long . . . . 5. **A. mollissima** (C. A. M.) N. Busch.

1. **A. thaliana** (L.) Heynh. in Holl. et Heynh., Fl. Sachs. I (1842) 538; N. Busch in Fl. cauc. crit. III, 4 (1909) 458; Fl. Sib. et Or. Extr. IV (1926) 415 cum tab. geograph. 417; Kryl., Fl. Zap. Sib. VI, 1339. – Arabis thaliana L., Sp. pl. (1753) 665. – Sisymbrium thalianum J. Gay et Monnard in Ann. Sc. Nat. Bot. Sér. VII (1826) 399, in adn.; Ldb., Fl. Ross. I, 184; Shmal'g., Fl. I, 68. – Ic.: Smith, Engl. Bot. tab. 901; Rchb., Ic. Fl. Germ. tab. LX, f. 4380. – Exs.: HFR No. 355.

Annual or biennial; stem usually solitary, 4.5–70 cm high, slender, erect, simple or branching, stem and leaves covered with simple or 2–3-partite hairs; leaves oblong-lanceolate or oblong, remotely denticulate, radical 78 leaves rosulate, tapering into a short petiole, cauline leaves few, sessile, smaller. Raceme dense at flowering, strongly elongating and becoming very loose post anthesis, 8–40-flowered; sepals 1.5–2 mm long, oblong, obtuse; petals white, 3–4 mm long, oblong; lateral nectariferous glands semispheroid, rather large; ovary 48–68-ovuled; fruiting pedicels thin, spreading, 4–15 mm long; siliques erect, glabrous, often curved, 9–18 mm, rarely 3 cm long, 0.75 mm broad; style thin, short; valves with one thin nerve; septum hyaline, without strand; seeds reddish to grayish brown, ovate, uniseriate, 0.5 × 0.4 × 0.3 mm. May–June.

Solonetzic steppes, solonetzes, rocks, stony slopes, fields, as a weed. – European part: all; Caucasus: Cisc., Dag., W. and E. Transc., S. Transc., Tal.; W. Siberia: Ob, Irt., U. Tob.; Centr. Asia: Balkh., Syr D., Pam.-Al. **Gen. distr.**: Atl. Eur., Scand., Centr. Eur., Med., Arm.-Kurd., Iran. Described from Scandinavia. Type in London.

2. **A. parvula** (Schrenk) Schulz in Pflzr. IV, 105 (1924) 269; N. Busch in Acta Inst. Bot. Acad. Sc. Sér. I, fasc. III (1936) 364. — Diplotaxis ?parvula Schrenk. ap. Fisch. et Mey. in Bull. Acad. Sc. Pétersb. II (1844) 199. — Sisymbrium parvulum Lipsky in A. H. P. XXIII, I (1904) 25, No. 112.

Annual, completely glabrous; stem slender, very flexuous, simple or branching, 3—15 cm high; leaves obtuse, fleshy, the lower oblong or ovate-spatulate, the upper linear. Racemes often opposite; sepals 2 mm long, linear, sometimes colored; petals absent; fruiting pedicels 3—6 mm long, erect; siliques broad-linear, 6—15 mm long, flattened, tuberculate, with a very short and stout style; valves with a slender midrib and thinner, netted lateral veins; seeds pale grayish brown, shiny. April—May.

Solonetzes and solonchaks. — European part: L. V.; Caucasus: S. Transc. (Nakhichevan ASSR); Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Asia Minor. Description based on a specimen collected by Schrenk from the Ters-Akkan River. Type in Leningrad.

3. **A. pumila** (Steph.) N. Busch in Fl. cauc. crit. III, 4 (1909) 457, 465. — Sisymbrium pumilum Steph. ap. Willd., Sp. pl. III, I (1800) 507; Shmal'g., Fl. I, 68. — S. kokanicum et S. hirtulum Rgl. et Schmalh. in A. Fedch. Putesh. (1882) 9. — Stenophragma pumilum Čelak. in Flora LV, 28 (1872) 440, 442.

Annual, covered with branching soft hairs; stem 4—50 cm high, simple or branching from base; leaves oblong or obovate, tapering at base, radical leaves emarginate-dentate or bipartite, cauline leaves sagittate-amplexicaul, at base dentate. Sepals 1.5—2 mm long; petals 2—3 mm long, straw-colored; siliques linear, slightly curved, slightly flattened, 11—25 mm long, downy with branching hairs; fruiting pedicels 5—12 mm long, rarely
79 2—3 mm long; valves nerved, with distinct midrib, style 0.2—0.8 mm long; seeds uniseriate, oblong-ellipsoid, 0.75 × 0.4 × 0.25 mm. March—May.

Solonetzes and solonchaks. — European part: L. Don, L. V.; Caucasus: Dag., E. and S. Transc.; Centr. Asia: Balkh. **Gen. distr.**: E. Med., Iran. Described from the Caucasus, from Kizlyar. Type in Leningrad.

4. **A. toxophylla** (M. B.) N. Busch in Fl. cauc. crit. III, 4 (1909) 457, 466; Fl. Sib. et Or. Extr. IV (1926) 420; Schulz; Sisymbrieae in Pflzr. IV, 105 (1924) 284; Kryl., Fl. Zap. Sib. VI, 1341. — Arabis toxophylla M. B., Fl. taur.-cauc. III (1819) 448. — Sisymbrium toxophyllum C. A. M. in Ldb., Fl. Alt. III (1831) 142; Ldb., Fl. Ross. I, 185; Schmal'g., Fl. I, 67. — Ic.: Ldb., Ic. Fl. Ross. III (1831) 5; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 421 et tab. geogr. 422.

Annual or perennial, with long and stout rootstock; stems one or few, erect, usually branching, 10—45 cm high; lower part of stems and lower leaves covered with short stellate hairs, upper part of plant glabrous; radical and lower cauline leaves oblong, almost always emarginate-dentate, tapering into a petiole, cauline leaves sessile, lanceolate, acute, sagittate at base, obscurely dentate or entire. Raceme dense at flowering, subcorymbose subanthesis, later elongated, 20—30-flowered; sepals 2.5—4 mm long, oblong, obtuse, glabrous or with sparse stellate hairs; petals white, 6—8 mm long, obovate-cuneate; ovary on short gynophore, ovules 32—50; fruiting pedicels 5—15 mm long, slender, ascending-erect; siliques erect, with short gynophores (0.5—1 mm long), narrowly linear, 1—2.7 mm long, slightly flattened, 0.75 mm broad, glabrous; valves slenderly 1-nerved, septum hyaline, nerveless; style very short, 0.5–0.75 mm long, stout; seeds biseriate, ovate, 0.5–0.6 × 0.3 × 0.2 mm, reddish to grayish brown; cotyledons linear. May–June.

Solonetzes and solonchaks. – European part: Bl., L. Don, Transv., L. V., Crim.; W. Siberia: U. Tob., Alt., Irt.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Afghanistan, W. Tibet. Described from Perekop. Type in Leningrad.

5. **A. mollissima** (C. A. M.) N. Busch, Fl. Sib. et Or. Extr. I (1913) 136; Schulz in Pflzr. IV, 105 (1924) 280; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 417; Kryl., Fl. Zap. Sib. VI, 1340. – Arabis rupicola Kryl., A. H. P. XXI, I (1903). – Sisymbrium mollissimum C. A. M. in Ldb., Fl. Alt. III (1831) 140; Ldb., Fl. Ross. I, 185. – Ic.: Ldb., Ic. pl. Ross. III (1831) tab. 262; N. Busch, l. c., 418, 419 et tab. geogr. 420.

Perennial; rootstock 2–3 mm thick, stem usually solitary and simple, 10–70 cm high, stem and leaves densely covered with simple and shorter
80 2–4-partite fine hairs; radical leaves oblong, tapering into a short petiole, emarginate-dentate, cauline leaves sessile, lanceolate, acute, sagittate at base, the lower obscurely-dentate, the upper entire. Raceme corymbose, dense subanthesis, later much elongated, 20–40-flowered; sepals 2–2.5 mm long, oblong, rounded at apex, hairy; petals white, 3–4 mm long, oblong, claws of petals and sepals violet; fruiting pedicels 4–15 mm long, sometimes the lower up to 20 mm long, nearly spreading, siliques suberect to ascending, linear, 12–40 mm long, 1–1.75 mm broad, glabrous, style slender, ca. 1 mm long; valves with a prominent midrib (and therefore siliques tetragonous); septum very thin; seeds uniseriate, yellow-reddish, 1 mm long, 0.5 mm broad. June–July.

Dry rocks. – W. Siberia: Irt., Alt.; E. Siberia: Lena-Kol.; Far East: Okh. (Gizhiginsk); Centr. Asia; Pam.-Al. Gen. distr.: Iran., Ind.-Him., Tib., NW Yunnan. Described from Altai (banks of the Chuya River). Type in Leningrad.

6. **A. verna** (C. Koch) N. Busch in Fl. cauc. crit. III, 4 (1909) 457, 460. – Drabopsis verna C. Koch in Linnaea XV (1841) 253. – Sisymbrium nudum Boiss., Fl. Or. I (1867) 214; Suppl. 42. – Drabopsis nuda (Bélanger) Stapf ex Schulz, Nat. Pflzf. Bd. 17b, 548.

Annual; stem 1.5–9 cm high; leaves radical only, covered with branched hairs, minute, oblong, entire or slightly dentate leaves. Scapes leafless, bearing small flowers; sepals 1.3–1.6 mm long; petals oblong-linear, pale straw-colored, 1.5–2.25 mm long; pedicels nearly as long as calyx, in fruit 1.5–3 mm long, as broad as siliques; siliques erect, flattened-tetragonous, glabrous (var. leiocarpa N. Busch) or hairy (var. hebecarpa N. Busch), 19–36 mm long. June.

Caucasus: S. Transc.; Centr. Asia: Balkh. Gen. distr.: As. Min., E. Med., Arm.-Kurd., Iran., Ind.-Him. Described from the southern part of Shuragel (Leninakan District). Type in Leningrad.

Genus 578. **CYMATOCARPUS**[*] O. E. SCHULZ[**]

O.E.Schulz in Pflzr.IV, 105 (1924) 300.

Sepals ascending-erect, subequal. Petals sulfur-yellow, short-clawed. Filaments broadly linear or subulate, anthers oblong, obtuse. Nectariferous glands connate, the lateral hexagonal-annular, the median tuberculate. Ovary sessile, 18–28-ovuled, style very short, stigma bilobate, broader than style. Siliques long, linear, flattened, strongly moniliform-tuberculate, obtuse at tip; valves with a very slender midrib and obscure longitudinal lateral nerves. Septum transparent, without strand (nerves). Seeds
81 uniseriate, flattened, ellipsoidal, embryo notorrhizal. Cotyledons very narrow, linear, shorter than the stout radicle. — Three species, two of which are common in Central Asia and one in Transcaucasia.

1. Leaves dentate . . . . 1. **C. pilosissimus** (Trautv.) Schulz.
+ Leaves pinnate . . . . 2.
2. Siliques pendulous on long (14–16 mm long) pedicels . . . . 2. **C. grossheimi** N. Busch.
+ Siliques ascending-erect, on shorter (8–11 mm long) pedicels. . . . . 3. **C. heterophyllus** (M. Pop.) N. Busch.

1. **C. pilosissimus** (Trautv.) Schulz in Pflzr. IV, 105 (1924) 300. — Sisymbrium pilosissimum Trautv. in A. H. P. IX, I (1884) 369 et IX, 2 (1886) 439. — Ic.: Schulz, l. c., 301, f. 64.

Annual; stem erect, 20–90 cm high, flexuous, covered with long, rough, simple, white hairs; leaves petiolate, the lower obovate or elliptic, more or less obtuse at apex, remotely dentate, the upper leaves short-petiolate, oblong-acute, distinctly dentate at base, the uppermost sublinear, all partly pubescent beneath along midrib. Raceme corymbiform at flowering, later strongly elongating, 20–30-flowered; pedicels 6–12 mm long, in fruit up to 20 mm long; sepals yellowish, 3–3.5 mm long, broadly membranous along margin; petals 5–6.5 mm long, sulfur-yellow, siliques declinate or pendulous, 2.5–5 cm long, 1.5–2 mm broad, glabrous or hairy (var. dasycarpus Schulz); seeds 1.5–1.8 mm long, 0.8–1 mm broad, 0.5 mm thick.

Centr. Asia: Kara K., Mtn. Turkm. Endemic. Described from Kizyl-Arvat. Type in Leningrad.

2. **C. grossheimi** N. Busch in Monit. Jard. Bot. Tiflis, Nouv. Sér. 3–4 (1927) 1 cum icone.

Annual; stem erect, densely branching at base, very sparsely covered with short, white, simple, soft hairs, completely glabrous at summit; leaves pinnately divided, covered with soft white hairs. Racemes ebracteate, elongating post anthesis, loose; pedicels filiform, in fruit 14–16 mm long; sepals 1.5–2.4 mm long, straw yellow, with long, soft white hairs; petals sulfur-yellow, 2.5–3.5 mm long, 1.5–1.75–2 mm wide, obovate, short-clawed; lateral nectariferous glands form rings round the base of the short stamens, the middle glands forming cylinders outside the long stamens, coalescent with the lateral glands into an overall ring; filaments edentate, somewhat broadening toward base, the longer ca. 2.5 mm long, the shorter ca. 1.75–1.9 mm long; siliques ca. 2 cm long, ca. 1 mm broad; valves

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[*] From the Greek cyma — wave, and karpos — fruit.

[**] Treatment by N. A. Bush.

82 somewhat convex, very obscurely 3–5-nerved; septum with marginal network of fibers and many epidermal cells with thin parallel walls; style ca. 0.6–0.7 mm long; seeds 2–5–7 in each cell, olive-colored, very finely tuberculate, oblong, ca. 2 mm long, ca. 0.6 mm broad.

Caucasus: S. Transc. Endemic. Described from the Nakhichevan ASSR between Dzhulfa and Aza. Type in Leningrad.

Note. According to Schulz this species is distinguished from C. pilosissimus (Trautv.) by the leaf and seed shape, the shorter and sparser stem pubescence, the longer [sic] and thinner fruiting pedicels, and the shorter, few-seeded, (pendulous) siliques. It is distinguished from C. heterophyllus (M. Pop.) mainly by its pubescent and pendulous siliques, according to Bush.

3. **C. heterophyllus** (M. Pop.) N. Busch, comb. nova. – Sisymbrium heterophyllum M. Pop. in Tr. Turk. Nauch. Obshch. I (1923) 35, cum icone.

Annual slender plant; stem 10–30 cm high, gray pubescent below, glabrous, above, erect, flexuous, branching; lower leaves petiolate, oblong, 2-pinnately divided into linear lobules, upper leaves entire, linear-oblong, resembling siliques, often curved or straight. Raceme short at flowering, elongating in fruit; pedicels 8–11 mm long, filiform subhorizontal almost divaricate; sepals oblong, obtuse, 2 mm long; petals yellow, 3.5–4 mm long, rapidly tapering to a claw half as long as the ovate-obtuse blade; filaments subulate; siliques ascending-erect, linear, slightly flattened, glabrous, 10–15 mm long, almost 1 mm broad. April–May.

Saline sandstone mountains and clayey gravelly steppes. – Centr. Asia: Kyz. K., Amu D. Endemic. Described from Bukhara, Baisun District, near the village of Yakubbai-Karyz. Type in Leningrad and Tashkent.

Genus 579. **DESCURAINIA*** WEBB et BERTH.**

Descurea Guettard, Observ. pl. II (1747) 164; 166; Descurainia sect. II Sophia Webb et Berthel., Phytogr. canar. I (1836–1840) 72 (excl. sect. I Irio); Descurainia sect. II, Eudescurainia Prantl. in Engl. Pr. Nat. Pflzf. III, 2 (1890) 192; Hayek, Crucif.-Syst. (1911) 188; Schulz in Pflzr. IV, 105 (1924) 305; Sisymbrium L. Sp. pl. (1753) 657 pro parte.

Sepals ascending-erect or spreading, not saccate. Petals of various shades of yellow. Filaments broadened toward base, edentate. Nectariferous glands finely tuberculate, the lateral annulate, emarginate inside, the 83 median cylindrical, connate with the lateral to form a closed ring; ovary sessile, style short, stigma truncate or slightly bilobate. Fruit a bivalved silique, linear or lanceolate; valves convex, with a prominent median rib and mostly with 2 lateral reticulate nerves. Epidermal cells of the septum somewhat elongated longitudinally, walls undulate. Seeds uniseriate, rarely biseriate. Cotyledons flat, embryo notorrhizal. – Herbs with leaves pinnately dissected into narrow lobules with branched hairs.

A genus of 43 species distributed in North and South America, Asia, Europe and Macaronesia (one of the phytogeographical subregions of the Holarctic region, comprising several mountainous islands in the Atlantic, lying west of the Canary and Madeira Islands and the Azores). Only 2 species grow in the Soviet Union: D. sophia, which is widely distributed throughout the temperate Eurasian zone, is a ruderal plant; D. sophioides is mainly a tundra plant. A third species is noted below in view of its possible discovery in the Soviet Union.

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* In honor of F. Descurain, friend of Jussieu. Descurainia nomen conservandum according to the International Regulations 1935.

** Treatment by N. A. Bush.

The name Descurea has priority. Webb and Berthelot changed this name to Descurainia nearly 100 years later.

1. Racemes short; upper leaves often 1-pinnate; slightly pubescent with glandular hairs. Siliques up to 1.75 mm broad . . . . 3. **D. sophioides** (Fisch.) N. Busch.
+ Racemes long; all leaves 2- or 3-pinnate; pubescent with branched hairs . . . . 2.
2. Siliques 18—30 mm long, ca. 1 mm broad . . . . 1. **D. sophia** (L.) Schur.
+ Siliques very thin, 8—12 mm long, three times narrower than in D. sophia (L.) . . . . 2. **D. kochii** (Petri) Schulz.

1. **D. sophia** (L.) Schur, Enum. pl. Transsylv. (1866) 54; Webb in Engl. et Prantl. Nat. Pflzf. III, 2 (1890) 192; Kryl., Fl. Zap. Sib. 6 (1931) 1337. — Sisymbrium sophia L., Sp. pl. (1753) 659; Ldb., Fl. Ross. I (1842) 180; Shmal'g., Fl. I (1895) 67; Kom., Fl. Manchzh. II (1903) 355; N. Busch in Fl. cauc. crit. III, 4 (1908) 204; Fl. Sib. et Or. Extr. I (1913) 148. — Ic.: Fl. Dan. III, 528; Rchb., Ic. Fl. Germ. II, tab. 74, f. 4405; N. Busch, Fl. Sib. et Or. Extr. I, 149 et tab. geogr. 151. — Exs.: HFR No. 1556.

Annual, canescent with short branched hairs, sometimes subglabrous (var. glabrata N. Busch); stem 15—80 cm high, erect, spreadingly branching; leaves 2- sometimes 3-pinnatipartite, with linear or oblong-linear acute lobules, (on solonetzic soils lobules thicker — var. salsuginea Schulz). Racemes many-flowered, in fruit 6—40 mm long; sepals spreading; petals pale yellow, oblong, ca. 2—2.5 mm long, equal to or shorter than sepals, or longer (var. dolichopetala Schulz) or sometimes completely absent (var. apetala (Noulet) Schulz); fruiting pedicels thin, 7—14 mm long; 84 siliques 10—30 mm long, ca. 1 mm thick, 10—14 mm in var. brachycarpa Boiss., 3—4 cm in var. longisiliqua (Gruner) Schulz, slender, curved upward, tuberculate; seeds grayish-brownish, 1—1.25 mm long, 0.5—0.75 mm broad. May—August.

Weedy and solonetzic places, near dwellings, roadsides, fields, meadows, and slopes. — European part: all, except for the Arctic (tundra and forest-tundra), Crim.; Caucasus: all; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenis., Ang.-Say., Lena-Kol., Dau.; Far East: Ze.-Bu., Okh., Uss., Kamch.; Centr. Asia: all. Gen. distr.: Eur. (all), N. Afr., W. Asia to Ind. and Tib., Ch., Mong., carried by wind to N. Am. Described from Europe. Type in London.

Economic importance. The seeds have a pungent flavor and are used instead of mustard in the Caucasus. The ash contains quantities of saltpeter.

*2. **D. kochii** (Petri) Schulz in Pflzr. IV, 105 (1924) 315. — Sisymbrium kochii Petri in Ind. sem. Hort. Berol. (1868) 24 et in Bot. Zeit. XXVI, 34 (1868) 558; Boiss., Fl. Or. Suppl. (1888) 43; N. Busch in Fl. cauc. crit. III, 4 (1908) 208.

Annual, sparsely hairy with fine down of short branched hairs; stem high, 10–80 cm, divaricately branching above; leaves green, 2-pinnatipartite, lobules narrowly linear. Racemes many-flowered, elongating at end of flowering; sepals 2 mm long, broadly oblong, obtuse, yellow; petals bright yellow or orange, 3 mm long, narrowly obovate, tapering into a claw; fruiting pedicels 6–9 mm long, spreading or slightly recurved below; siliques recurved above, linear, very thin, 8–12 mm long, narrower than in the preceding species; style 0.4 mm long, very short; septum nerveless; seeds uniseriate in 1 row, oblong-ellipsoidal, reddish-brownish. April–June.

Fields, crops, river gravels. — **Gen. distr.:** Med., As.-Min., Arm.-Kurd. Described from Armenia (Sber). Type in Berlin.

Note. Described in view of its possible discovery in the Soviet Union.

3. **D. sophioides** (Fisch.) Schulz in Pflzr. IV, 105 (1924) 316; Kryl., Fl. Zap. Sib. VI (1931) 1338. — Sisymbrium sophioides Fisch. ex Hook., Fl. bor.-am. I (1833) 61; Ldb., Fl. Ross. I (1842) 181; Kom., Fl. Manchzh. II (1903) 356 (in nota); N. Busch, Fl. Sib. et Or. Extr. I (1913) 151. — Ic.: Hook., Fl. bor.-am. I (1833) tab. 20; N. Busch, l. c., 152 et tab. geogr. 153.

Annual and perennial, somewhat pubescent, glandular; stems 15–120 cm high, erect, long-branched; lower leaves 2-pinnate, lobes ovate-oblong, the upper leaves often 1-pinnate, lobes oblong or linear, incised. Racemes short, 2–20 cm long; sepals 1.8–2 mm long; petals yellow, 2–3 mm long, as long as or somewhat longer or slightly shorter than sepals, narrowly spatulate; fruiting pedicels 3–13 mm long, ascending-erect or slightly 85 recurved below, thin; siliques linear, 9–30 mm long, 0.75–1.75 mm broad, sometimes falcately bent, tuberculate, yellowish; style hardly distinct; valves 1-nerved; septum transparent, white, shiny, with a midrib; seeds grayish brown, oblong, biseriate, 1.25 mm long, 0.5 mm broad. June–August.

Slopes and weedy places, mainly in tundra and tundra-forest. — Arctic: Arc. Sib., Chuk., An.; W. Siberia: Ob; E. Siberia: Yenis., Lena-Kol.; Far East: Kamch. (Karaginsk). **Gen. distr.:** Arc., Am. (NW). Described from northwestern Arctic America, from Kotzebue Sound. Type in Leningrad.

Genus 580. **CHRYSOCHAMELA** * (FENZL) BOISS.**

Boiss., Fl. Or. I (1867) 313; Hayek, Cruciferen-System (1911) 190.

Sepals divergent, not saccate. Petals yellow. Stamens edentate, dilated at base. Lateral nectariferous glands each forming a ring around the short stamens, the median glands larger, forming tubercles between the long stamens. Ovary sessile, style very short, stigma obtuse. Fruit an ellipsoidal or obovoid silicle, valves strongly convex and sometimes rather keeled, with a large midrib. Septum delicate, cells polygonal, with strongly undulant thick walls. Seeds biseriate. Cotyledons flat, embryo notorrhizal. Hairs branching. — Small annuals, with entire or pinnate leaves.

Four species from Assyria, Asia Minor, and Kurdistan. The finding of a specimen of this genus in Bashkiria is rather unusual; it may be due to the adventive growth of this plant. According to E. G. Bobrov, who found the plant in Bashkiria, in a pine forest near Kurmanaev, it grows in burned areas. It could have been somehow carried to Bashkiria from the East.

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* From the Greek chrysos — gold, and chamelos — on the ground.

** Treatment by N. A. Bush.

Yu. N. Voronov described this plant as a new species, naming it C. draboides Woron. O. E. Shult's, to whom it was sent, referred it to the old species C. elliptica Boiss.

1. **C. draboides** Woron. in Flor. Vostoka V (1931) 397 cum icone, p. 398.

Annual; stem branching from base, with branched hairs on the lower part, the upper glabrous; lower leaves oblong, the upper oblong-linear and linear, amplexicaul, auricled, pubescent. Racemiferous branches geniculate-flexuous; flowers small; petals pale yellow, 1–1.2 mm long, somewhat longer than the oblong sepals; fruiting pedicels ascending, 7–10 mm long; siliques oblong or oblong-elliptic, 5–7 mm long, 1.8–2 mm broad, 86 obtuse at apex, slightly tapering toward base, glabrous, reticular-venose, with a very short style; seeds small, 0.25–0.3 mm long, light yellow-grayish brown.

European part: Transv. Described from Bashkiria, Sterlitamak canton, Kurmanaevo, pine forests on slopes, and on an incline over the Aurgazy River. Type in Leningrad.

Note. It is probable that this plant will be omitted from the Flora of the USSR as was Ochthodium aegyptiacum DC., Syst. II (1821) 423, which was recorded from the Crimea (without locality) by O. and B. Fedchenko (Fl. d. l. Crimée 814) on the basis of a Bertoldi specimen. No other botanist has found this plant in the Crimea.

Genus 581. **SOPHIOPSIS** * SCHULZ**

Schulz Sisymbrieae in Pflzr. IV, 105 (1924) 346.

Sepals spreading, not saccate. Petals white or yellow, obovate-cuneate. Nectareous glands united, the lateral annular, sometimes open inside, the median tuberculate. Ovary 4–12-ovuled. Silicles ellipsoidal or oblanceolate, bivalved, valves keeled. Style very short. Septum very thin, nerveless or 1-nerved, often perforated at base. Seeds uniseriate, ca. 1.5 mm long, flattened, brown, tuberculate-striate under magnifying lens. Embryo obliquely or erectly notorrhizal. Cotyledons elliptic. — Biennial, rarely perennial, covered with branched and simple hairs, stems branching, leaves pinnatisect, fruiting pedicels filiform.

Four Central Asian species.

1. Flowers yellow, silicles linear, dilated in the middle .... 4. **S. flavissima** (Kar. et Kir.) Schulz.
+ Flowers white, silicles ellipsoidal or obovate .... 2.
2. All leaves 2-pinnately divided, fruiting pedicels 8–12 mm long. Silicles obovate .... 1. **S. sisymbrioides** (Rgl. et Herd.) Schulz.
+ Upper leaves hardly 2-pinnate or 1-pinnate. Fruiting pedicels 5–7–16 mm long, silicles ellipsoidal .... 3.

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* From Sophia and the Greek opsis — species.

** Treatment by N. A. Bush.

3. Plant biennial, prostrate . . . . 2. S. annua (Rupr.) Schulz.
+ Plant perennial, with long and stout rootstock and ascending stems . . . . 3. S. mongolica (Kom.) N. Busch.

1. **S. sisymbrioides** (Rgl. et Herd.) Schulz in Pflzr. IV, 105 (1924) 346 cum 87 icone. — Hutchinsia sisymbrioides Rgl. et Herd. in Bull. Mosc. XXXIX, 2 (1866) 143, No. 114 et 148. — Smelovskia sisymbrioides Lipsky ap. O. Paulsen in Vidensk. Meddel. Naturb. Foren. Kjobenh. (1903) 137, No. 38. — S. alba Fedtsch. in A. H. P. XXIII, 2 (1904) 423, No. 169, non Rgl.

Biennial, many-stemmed plant; rootstock long; stems erect, 20—50 cm high, very flexuous, branched at summit, covered with white floccose hairs (including sepals); lower and middle leaves petioled, 4—4.5 cm long, the upper with shorter petioles, up to 1 cm long, all 2-pinnately divided, with 3—4 pairs of leaflets, the uppermost with 1—2 pairs, lobules oblong-obovate. Raceme short-corymbiform at the beginning, later elongating, many-flowered; sepals yellowish, 2—2.5 mm long; petals white, 3—3.5 mm long, 1—1.5 mm broad, tapering into a claw; pedicels spreading, 8—12 mm long in fruit; silicles oblanceolate or obovate or ellipsoidal, 5—7 mm long, 1—1.5—2 mm broad, valves boat-shaped, 1-nerved, style 0.25—0.5 mm long, septum strandless; seeds 1.5× 75 × 0.4 mm, brown. June.

Rocky slopes and rocky riverbanks, slate taluses. — Centr. Asia: T. Sh., Pam.-Al., Amu D., Syr D., Balkh., 2,000—3,000 m. Endemic. Described from Trans-Ili Ala-Tau, Merke River. Type in Leningrad.

2. **S. annua** (Rupr.) Schulz in Engler Pflzr. IV, 105 (1924) 347. — Smelovskia annua Rupr. in Mém. Acad. Sc. Pétersb. 7 Sér. XIV, 4 (1869) 39. — Hutchinsia annua Krasn. Op. ist. r. fl. vost. Tyan'-Shanya (1888) 344

Biennial; stems prostrate, ascending at summit to 35 cm, often only 10 cm long, numerous, finely pubescent at the lower part; leaves 2-pinnately divided, lobules oblong or obovate, radical leaves petiolate, petioles 1—4 cm long, upper leaves subsessile, 1-pinnate. Racemes corymbiform at flowering, 10—30-flowered; pedicels strongly pubescent, in fruit 5—7—10 mm; sepals 1.5—2—2.5 mm long, oval, deciduous; petals pale yellow, 2.5—4—4.5 mm long, 1—1.5 mm broad, broadly oval, orbicular at apex; siliques ellipsoidal, 5—8 mm long, 1.5—3 mm broad; style very short; seeds ovate, brown, 1.75 mm long, 1 mm broad, puncticulate. June—July.

Clayey, stony, and gravelly slopes, solonetzic steppes, moraines at 2,400—4,000 m. — Centr. Asia: T. Sh., Dzu.-Tarb., Syr D., Pam.-Al. (Shugnan, Fergana). Gen. distr.: Dzungaria-Tarbagatai (Kashgaria). Described from Chatyr-Kul Lake. Type in Leningrad.

★3. **S. mongolica** (Kom.) N. Busch comb. nova. — Smelowskia mongolica Kom. in Fedde Repert. IX (1911) 393. — Sophiopsis annua var. 88 mongolica Schulz in Pflzr. IV, 105 (1924) 348.

Perennial, rootstock thick; stems numerous, ascending, 15—60 cm long, subglabrous; leaves 2-pinnately divided, with 4—10 pairs of segments, radical leaves with long slightly pubescent petioles; leaves 3—8.5 cm long, the upper with shorter petioles, 3—6 mm long, lobules ovate, slightly pubescent. Raceme long; fruiting pedicels 7—16 mm long, sparsely hairy, arcuate; sepals ovate, 1.5—2 mm long, slightly pubescent, with white rim along margin; petals white, rounded at apex, 3.5 mm long, 2 mm broad, tapering into a claw; silicles ellipsoidal, 5–11 mm long, 2.5–5 mm broad, style 0.75–1 mm long; seeds ovate, brown, with a deep furrow in the middle. June.

In alpine rocky steppes, on gravelly slopes, in river gravels. Described from northern Mongolia, from the Zagistai River valley. Type in Leningrad.

Note. Mentioned in view of its possible discovery in the USSR.

4. **S. flavissima** (Kar. et Kir.) Schulz in Engler, Pflzr. IV, 105 (1924) 348. — Sisymbrium flavissimum Kar. et Kir. in Bull. Soc. Nat. Mosc. (1841) 382, No.91. — Smelovskia flavissima Kar. et Kir. in Bull. Soc. Nat. Mosc. XV, I (1842) 156, No.117. — Hutchinsia flavissima Ldb., Fl. Ross. I (1842) 764.

Biennial, stem 35–100 cm high, erect, somewhat flexuous, branching at summit, covered with simple hairs, 1 mm or longer, and branching shorter hairs (including sepals), sometimes glabrous at summit; cauline leaves short-petiolate (petioles 1–2.5 cm long), pinnatisect, with 4–5 pairs of segments, the terminal segment obovate-cuneate, obtuse, the lateral decurrent, the upper leaves with shorter petioles, with 1–3 pairs of linear or subfiliform segments, all leaves pubescent as stem, or glabrous. Raceme very dense at flowering, ca. 50-flowered, elongating in fruit; pedicels glabrous, filiform; sepals obovate, yellowish, 1.5–1.8 mm long; petals yellow, 2–3 mm long, 1.3 mm broad, oval, rounded at apex, tapering into a claw as long as the obovate blade, rather broad; fruiting pedicels 8–11 mm long, spreading; silicles ellipsoid-linear, ca. 6 mm long, ca. 1 mm broad, valves 1-nerved, septum without nerve, style 0.5 mm long; seeds ovate, brown. May–June.

On mountain slopes and riverbanks. — Centr. Asia: Dzu.-Tarb., Amu D. Endemic. Described from Tarbagatai, from the banks of the Dzhany-bek and Terekta rivers. Type in Leningrad.

Note. There is one Krasnov specimen with the label "Altai."

89 Genus 582. SMELOVSKIA * C. A. M.**

C.A.M.in Ldb., Fl.Alt.III (1831) 165; Hayek, Crucif.-Syst.(1911) 189; Schulz in Engl., Pflzr.IV, 105 (1924) 352; N.Busch, Fl.Sib.et Or.Extr.4 (1926) 396.

Sepals ascending, not saccate, sometimes persistent. Petals white or pink. Filaments edentate. Lateral nectariferous glands annular, emarginate or open inside, the median glands cylindriform on outer side of the long stamens, united with the lateral to form a closed ring. Style conspicuous. Stigma bilobate. Fruit a bivalved lanceolate silicle or a short silique, ca. 4 to 5 times longer than broad, long-tapering toward base. Valves slightly coriaceous, flat or somewhat keeled, with a distinct midrib. Septum thin; epidermal cells irregularly polygonal, with straight or obscurely undulate thin walls. Seeds uniseriate. Cotyledons flat. Embryo notorrhizal.— Loosely cespitose, densely pubescent perennials with pinnate or 2-pinnate leaves and branched hairs.

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* In honor of Prof. T. Smelovskii, botanist.

** Treatment by N. A. Bush.

Of the seven species of this genus, three species occur in the USSR. The genus Smelovskia occupies two distribution areas: 1) The mountains of southern Siberia and Central Asia and 2) Pacific North America.

1. Silique linear, 8–14 mm long. Seeds narrowly oblong. Ovary with 14–18 ovules . . . . 1. **S. alba** (Pall.) Rgl.
+ Silicle ellipsoidal, 6–7 mm long. Ovary with 6–10 ovules. Seeds ellipsoidal . . . . 2.
2. Style 0.75–1 mm long. Ovary with 9–10 ovules . . . . 2. **S. calycina** (Steph.) C. A. M.
+ Style nearly absent; not longer than 0.25 mm . . . . 3.
3. Plant floccose-pubescent.. . . . . 3. **S. asplenifolia** Turcz.
+ Plant covered with finely branching hairs . . . . 4. **S. inopinata** Kom.

1. **S. alba** (Pall.) Rgl. in Bull. Soc. Nat. Mosc. XXXIV, 3 (1861) 208, No. 245 (excl. syn. C. A. M. et Bge.); Schulz, l. c., 353 cum icone; N. Busch, Fl. Sib. et Or. Extr. IV, 398; Kryl., Fl. Zap. Sib. VI, 1336. — Sisymbrium album Pall., Reis. III (1776) 293, Anh. 739, No. 102, tab. U, f. 1. — Smelovskia cinerea C. A. M. in Ldb., Fl. Alt. III (1831) 171 (quoad syn.); Kom., Fl. Manchzh. II (1903) 384. — Hutchinsia alba Ldb., Fl. Ross. I (1842) 201. —
90 Ic.: N. Busch, l. c., 399 et tab. geogr. 401.

Perennial, densely gray-pubescent with branched hairs, sometimes glabrous or subglabrous (var. glabra (Turcz.) Schulz); rootstock long, descending, woody, up to 6 mm in diameter, multicipital at summit; stems ascending, 10–45 cm high, covered at base by decayed petioles with simple hairs along their margin, 0.5–1 mm long; stem pubescent with simple hairs in small quantities mixed with soft branched hairs; lower leaves petiolate, upper subsessile, all pinnatisect, lobules oblong, obtuse, entire, rarely 1-toothed, sometimes 2–3-toothed on each side, and also with tiny lobules along the leaf-rachis (var. bipinnatifida) (Rgl. et Herd.) Schulz). Raceme dense at flowering, later elongating, loose, 30–50-flowered; sepals 2–3 mm long, deciduous; petals white, 3–4.5 mm long, 2–3.5 mm broad, abruptly tapering into a claw, sometimes sepals up to 4 mm long, petals up to 6.5 mm long, 6 mm broad (var. macropetala N. Busch); fruiting pedicels 7–15 mm long, siliques linear, slightly tetragonous, 8–15 mm long, 1–2 mm broad, lightly tapering toward both ends; style 0.75–1.25 mm long, sometimes absent (stigma sessile) (var. tilingi Rgl.); septum without nerve; seeds narrowly oblong, 1.2 mm long, 0.5 mm broad, obtuse at base, brown. June–July.

Rocks, near rock streams, steppe-slopes. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau. Gen. distr.: Mongolia. Described from Baikal. Type in Leningrad.

2. **S. calycina** (Steph.) C. A. M. in Ldb., Fl. Alt. III (1831) 170; Schulz in Engl. Pflzr. IV, 105, 355; N. Busch, Fl. Sib. et Or. Extr. IV, 402; Kryl., Fl. Zap. Sib. VI, 1334. — Lepidium calycinum Steph. in Willd., Sp. pl. III, 1 (1800) 433. — Hutchinsia calycina Desv., Journ. Bot. III, IV (1814) 168; Ldb., Fl. Ross. I, 200. — H. pectinata Bge. in Ldb., Fl. Ross. I (1842) 201. — Ic.: N. Busch, l. c., 403 et tab. geogr. 404.

Perennial, many-tufted, wholly covered with branched hairs mixed with simple ones, sometimes greenish and sparsely pubescent (var. glabrata (Ldb.) Schulz); rootstock long, robust, multicipital at summit; stems

ascending, 5–10 cm high, simple, covered at base with decayed petioles, ciliate along margin with simple hairs up to 1 mm long; lower leaves long-petiolate, upper subsessile, all leaves pinnatisect, lobules oblong, obtuse, slightly tapering toward base, entire, rarely 1-toothed on each side, whitish-tomentose or densely pubescent with branched hairs, sometimes cauline leaves green and rather sparsely pubescent, then lobules linear, acute (var. pectinata (Bge.) Fedtsch.). Raceme dense, elongating at flowering, 12–20-flowered, sometimes loose, bearing up to 40 flowers; calyx long persistent, sepals 3–4 mm long; petals white, 5–7 mm long, 3–4 mm broad, nearly rounded, undulate along margin, rapidly tapering into a claw; ovary 9–10-ovuled; fruiting pedicels 5–7 mm long; siliques
91 ellipsoidal, subtetragonous, acuminate at tip, tapering toward base, 6–7 mm long, 2 mm thick; style 1–1.25 mm long, thin, stigma capitate; septum 1-nerved; seeds ellipsoidal, 1.5–2 mm long, 0.6–1 mm broad, acute at base, grayish brown. June–July.

Rocks, by rock streams, and glacial moraines. — W. Siberia: Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. (Shugnan, Fergana). Gen. distr.: Mongolia. Described from the Altai alps. Type in Leningrad.

3. **S. asplenifolia** Turcz., Fl. baic.-dahur. I (1842) 285 (167); N. Busch, Fl. Sib. et Or. Extr. 6 (1931) 405. — Hutchinsia bifurcata Bge., Del. sem. Hort. Dorp. (1839) 8 et in Linnaea XIV (1840) 119; Ldb., Fl. Ross. I, 201. — Smelovskia calycina var. densiflora Schulz in Engl. Pflzr. IV, 105 (1924) 356.

Perennial, densely cespitose plant; rootstock robust, long, multicipital at summit, covered with decayed petioles; stems few, 5–20 mm [sic] long; stems, leaves, pedicels, and calyx floccose-pubescent; leaves pinnatipartite, lobules of radical leaves obovate, often divided into 2–3 lobes, lobules of cauline leaves oblong, entire or bifid. Raceme (at flowering and in fruit) dense; sepals deciduous, 2.5–3.5 mm long; petals 4.5–5.75 mm long, 3–4 mm broad; ovary 6-ovuled; fruiting pedicels 11–13 mm long; silicles 6–8 mm long, 2–2.5 mm thick, often grayish brownish violet; style hardly noticeable; seeds like those of S. calycina. June–July.

Rocks and rocky places in the high mountain belt. — E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb., T. Sh. Described from Dauria, from the Nukhu-Daban alps near the Dzhokhaoi stream. Types in Leningrad and Kharkov.

4. **S. inopinata** Kom. in herb. et in Not. Syst. VI, 1 (1926) 8 (sub Hutchinsia inopinata).

Perennial plant, many-stemmed, covered at lower part with many scales of decaying leaves, 10–20 cm high; leaves pinnatisect, with 3–4 ovate or oblong-obovate, sessile lateral segments (the upper larger than the lower and often bifid) and an apical one, long-petioled, mainly radical, pubescent, with soft branched hairs more profuse and rather tomentose below. Silicles oval, 6–7 mm long, ca. 1.5–2 mm broad, terminating with a short style and fleshy stigma; fruiting pedicels more or less declinate, 5–10 mm long; seeds obovate, ca. 3 mm long, 1.25–1.5 mm broad, reddish brown, 1–2 in each cell.

Rock streams. — Far East: Uss. Endemic (?). Described from Sikhote-Alin, where it was collected by I. K. Shishkin at 1,800 m in the upper timberline, on 18 August 1924. Type in Leningrad.

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Genus 583. **REDOVSKIA** * CHAM. et SCHLECHTD.**

Chamisso et Schlechtendahl in Linnaea I (1826) 32.

Sepals slightly divergent, equal. Petals white, oboval, rounded at apex. Filaments edenticulate. Nectariferous glands forming lateral rings, slightly open inside, appendages connate with the median line. Ovary borne on a gynophore. Style thin. Stigma bilobate. Fruit an inflated, broadly fusiform, dehiscent silicle. Valves inflated, with a midrib and few small nerves. Septum reduced into a narrow rim; seeds 6–9.

A monotypic, apparently old genus, endemic to the USSR.

1. **R. sophiifolia** Cham. et Schlechtd. in Linnaea I (1826) 33, tab. 2; Ldb., Fl. Ross. I, 161; Schulz in Pflzr. IV, 105, 362 cum fig. 74, p. 361; N. Busch, Fl. Sib. et Or. Extr. IV, 395 cum icone.

Perennial, tap-root thick; stems few, covered at base with decaying leaves, ascending, leafy, 10–20–30 cm high, together with leaves and pedicels densely covered with long unequal soft branching hairs (to 0.5 mm long); leaves bipinnate, lobules linear-elliptic, obtusish, rather dentate; radical leaves petiolate, cauline subsessile. Pedicels thin, 10–12 mm long in fruit; outer sepals pilose, 2–2.5 mm long; petals rounded-oboval, clawed, 3.5–4.5 mm long, 2–2.8 mm broad; silicle glabrous, somewhat globose-flattened; style 0.6 mm long.

E. Siberia: Lena-Kol. Endemic. Described from Ust Mai (Yakutia). Type in Leningrad.

Note. Almost all authors, including Schulz, were of the opinion that Redovskii had collected this plant in Kamchatka. In fact, Redovskii never was in Kamchatka.

Genus 584. **ERYSIMUM** † (TOURN.) L. ††

(Tourn.ex L.Syst.1735) L.Sp.(1753) 660.

Sepals erect, often saccate at base. Petals straight, clawed, yellow, rarely lilac or violet, very rarely white. Filaments edentate. Lateral inner
93 nectariferous glands embrace the shorter stamens, outer open; median glands at the outer side of the longer stamens, linear, free or joined with the lateral by narrow appendage. Ovary sessile, style conspicuous, stigma bilobate, with divergent lobes. Fruit a silique, linear, cylindrical or tetragonous, valves convex or subcarinate. Septum thick, the epidermal cells elongating, parallel, with very strongly thickened walls. Seeds uniseriate. Cotyledons flat, embryo notorrhizal in seeds at ends of silique, obliquely notorrhizal or even pleurorhizal. Hair 2-partite or 3-partite or stellate, mostly appressed. — Annual, biennial, or perennial herbs with entire leaves.

Of the 100 species of this predominantly Mediterranean genus, 51 species, or half the total number, grow in the Soviet Union.

This genus is distributed over nearly all Eurasia.

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* In honor of Ivan Redovskii, a traveler in East Siberia.

** Treatment by N. A. Bush.

† Greek erysimon from erysthai — to defend, protect, save.

†† Treatment by N. A. Bush.

Although Erysimum is predominantly Mediterranean, it is also distributed in Central and northern Europe and in North, Central, and East Asia. It is difficult to identify many of the species of this genus (one of the more reliable criteria is the character and distribution of the pubescence). The genus is apparently still in the process of speciation. It is a natural and relatively young genus. Only a few of its species may be regarded as ancient.

Species of Erysimum are common to all mountain belts, from steppes to the highest mountainous areas. There are few forest species (such as the ancient, Tertiary relic Erysimum aureum) and few alpine and Arctic species. There are many xerophytes, in dry habitats (rocks, dry hills, steppes), and plants in unturfed sites.

Some alpine species such as E. gelidum, E. pulchellum, and Arctic species like E. pallasi are used for decoration.

1. Flowers violet or lilac . . . . 2.
+ Flowers yellow or (very rarely) white . . . . 7.
2. Siliques appressed to axis . . . . 3.
+ Siliques divergent or horizontal . . . . 4.
3. Leaves oblong-lanceolate, petals ca. 15 mm long (Transcaucasia) . . . . 51. **E. strictisiliquum** N. Busch.
+ Leaves linear-lanceolate, petals 11–12 mm long (Central Asia) . . . . 50. **E. epikeimenum** N. Busch.
4. Biennial with very broad leaves, radical leaves oblong-obovate, cauline leaves oblong, emarginate-dentate, all covered with 3–4-partite hairs on both sides (Transcaucasia) . . . . 46. **E. lilacinum** Steinb.
+ Biennial or perennial with narrower leaves, solely with bifid
94 (Malpighian) hairs . . . . 5.
5. Pubescence of the whole plant solely of Malpighian hairs. Flowers sometimes pale yellow (Arctic) . . . . 49. **E. pallasi** (Pursh) Fernald.
+ Pubescence of the whole plant, except for siliques, of Malpighian hairs, siliques mostly with 3–4-partite hairs (Central Asia) . . . . 6.
6. Biennial with very robust edged stem, radical leaves linear-lanceolate or broadly linear. Siliques up to 5 cm long, usually 2–4 cm long. Style short, ca. 1 mm long . . . . 47. **E. violascens** M. Pop.
+ Perennial with slender stems, radical leaves linear. Siliques 12–25 mm long. Style ca. 1.5 mm long . . . . 48. **E. francheti** N. Busch.
7. Pedicel short, thick, not narrower than silique . . . . 8.
+ Pedicel thinner, narrower than silique . . . . 10.
8. Annual; leaves lanceolate, emarginate. Silique 5–9.5 cm long . . . . 34. **E. repandum** L.
+ Perennials, many-stemmed. Leaves linear or sublinear. Silique shorter . . . . 9.
9. All hairs 2-partite (simple, joined at the middle of their length). Silique cylindrical, 2.5–4 cm long. Leaves narrowly linear . . . . 42. **E. crassipes** C. A. M.
+ Hairs of stem and leaves 2-partite, and of siliques stellate. Silique gradually tapering at apex, 2.5–5 cm long. Leaves linear or sublinear . . . . 37. **E. persicum** Boiss.
10. Silique strongly compressed laterally (corymbiform), boat-shaped, keeled. All leaves sessile. Style thin, long, 3–10 mm . . . . 52. **E. cuspidatum** (M. B.) DC.

+ Silique cylindrical or tetragonous, slightly compressed or not compressed . . . . 11.

11. All hairs 2-partite . . . . 12.

+ Bipartite mixed with multipartite hairs, or all hairs 3–6-partite. . . . 21.

12. Low undershrub, silky-silvery, siliques silvery with smooth white appressed pubescence. Fruiting pedicels 3–5 mm long (Talysh) . . . . 16. **E. argyrocarpum** N. Busch.

+ Annual, biennial, or perennial herbs; siliques not silvery . . . . 13.

13. Fruiting pedicels shorter than calyx . . . . 14.

+ Pedicels almost as long as or much longer than calyx . . . . 15.

95 14. Annual, low plant. Siliques short (15–24 mm long), style thick, very short . . . . 45. **E. sisymbrioides** C. A. M.

+ Perennial, tall plant. Siliques 3.5–5 cm long. Fruiting pedicels 3.5–5 mm long (Caucasus) . . . . 15. **E. meyerianum** Rupr.

15. Pedicels nearly as long as calyx . . . . 16.

+ Pedicels up to 15–17 mm long in fruit . . . . 19.

16. Leaves lanceolate, tapering toward both ends, acute. Siliques slightly compressed, tapering toward apex (Transcaucasia) . . . . 44. **E. szovitsianum** Boiss.

+ Leaves linear-lanceolate or linear . . . . 17.

17. Petals 12–14 mm long, siliques tetragonous, pubescent, stigma bilobate . . . . 18.

+ Petals 11 mm long, siliques entirely pubescent, style very short. Stigma rather emarginate (Bukhara) . . . . 40. **E. babataghi** Korsh.

18. Siliques green (glabrous) along angles, petals lemon yellow, style short . . . . 38. **E. canescens** Roth.

+ Siliques pubescent also along angles, petals egg yellow in color. Style 3–4 mm long . . . . 41. **E. vitellinum** M. Pop.

19. Petals sulfur-yellow. Stems few or many, branchless . . . . 20.

+ Petals orange. Stems often solitary (East Siberia and Far East) . . . . 14. **E. aurantiacum** (Bge.) Maxim.

20. Stems few, leaves linear-oblong, sometimes dentate, green or gray . . . . 12. **E. altaicum** C. A. M.

+ Stems many, rootstock thick, multicipital leaves narrow, linear, entire, densely whitish or gray-pubescent . . . . 13. **E. humillimum** (Ldb.) N. Busch.

21. The whole plant pubescent with 2-partite hairs (Malpighian), only siliques with 3–4-partite hairs . . . . 22.

+ Leaves pubescent also or only with multipartite hairs . . . . 23.

22. Leaves linear-lanceolate. Petals 13–19 mm long, fruiting pedicels 3–4.5 mm long, nearly as thick as siliques. Siliques covered mostly with 3-partite hairs (Central Asia) . . . . 43. **E. badghysi** (Korsh.) Lipsky.

+ Leaves oblong or lanceolate. Petals 9–12.5 mm long, fruiting pedicels 4–10 mm long, very thin. Siliques glabrous or covered with 2–3–4-partite hairs. Profusely branched plant. Branches long, subhorizontal (Central Asia) . . . . 33. **E. czernjajevi** N. Busch.

96 23. All leaves with 3–4-partite hairs . . . . 24.

+ Leaves with 2-partite and/or multipartite hairs . . . . 32.

24. Pedicels and siliques divergent . . . . 25.

+ Pedicels and siliques appressed to stem (ascending). . . . . 29.

25. Pedicels patent or (rarely) recurved below, 6–15 mm long. Tall plants with oblong-lanceolate leaves . . . . 26.

+ Pedicels ascending-erect . . . . 27.

26. Style 1–2 mm long (Caucasus) . . . . 1. E. aureum M. B.

+ Style 2–3 mm long (southern European part) . . . 2. E. sylvaticum M. B.

27. Fruiting pedicels 2–4 mm long. Low plants with slender stems and siliques; on rocks . . . . 31. E. artvinense N. Busch.

+ Pedicels thin, in fruit 4–10 mm long. Tall plants with all or radical leaves oblong or lanceolate . . . . 28.

28. Flowers large, bright yellow and fragrant. Petals 13–16 mm long . . . . 3. E. pannonicum Crantz.

+ Flowers small, somewhat paler and not fragrant. Petals to 5 mm long . . . . 18. E. cheiranthoides L.

29. Fruiting pedicels 2.5–4 mm, rarely up to 6 mm long. Leaves with 3-partite (rarely 4-partite), siliques with 3–4-partite hairs . . . . 30.

+ Fruiting pedicels 5–8 mm long. Leaves and siliques with very minute stellate hairs . . . . 31.

30. Biennial. Lower leaves obovate-spatulate, remotely eroded-dentate or entire, the upper linear-lanceolate. Style 0.75–1.5 mm long (Caucasus) . . . . 17. E. brevistylum Somm. et Lev.

+ Perennial with multicipital rootstock. All leaves linear-lanceolate, entire. Style 1.5–2 mm long (Central Asia) . . . . 21. E. ischnostylum Fr. et Sint.

31. Pedicels thin, much thinner than siliques, as long as calyx. Siliques rounded-tetragonous. Style 1.5–2 mm long . . . . 22. E. collinum (M. B.) Andrz.

+ Pedicels thick, slightly narrower than silique, shorter than calyx. Siliques few, laterally compressed (from the suture side). Style 2 mm long . . . . 20. E. leptostylum DC.

32. Siliques short and very thick, only 10–14 mm long, up to 3 mm thick, acutely tetragonous . . . . 32. E. brachycarpum Boiss.

97 + Siliques much longer . . . . 33.

33. Siliques cylindrical, ascending but appressed to stem . . . . 34.

+ Siliques tetragonous or compressed . . . . 35.

34. Leaves linear. Style somewhat shorter than the width of silique. Silique 0.4–0.8 mm in diameter . . . . 35. E. leucanthemum (Steph.) B. Fedtsch.

+ Taller plant. Lower leaves oblong-spatulate, the upper oblong or linear-lanceolate. Style twice as long as the width of silique. Silique 0.6–0.7 mm in diameter . . . . 36. E. passgalense Boiss.

35. Silique tetragonous, dorsoventrally compressed . . . . 36.

+ Silique tetragonous, not compressed . . . . 49.

36. Leaf-hairs 3–4-partite . . . . 37.

+ Leaf-hairs 2-partite or mixed (2- and 3-partite) . . . . 38.

37. Stem erect, thin; cauline leaves narrowly-linear, dentate. Siliques up to 10 cm long. Siliques and pedicels with stellate hairs . . . . 30. E. caucasicum Trautv.

+ Stem thick, sulcate; cauline leaves oblong-lanceolate, emarginate-dentate. Siliques 5–12 cm long . . . . 7. E. ibericum DC.

38. Short plants, 2–11 cm high, tufted. Flowers nearly always bracteate (sometimes partly). Pedicels 7–10 mm long . . . . . 19. E. gelidum Bge.

+ Plants 20–50 cm high, not tufted. Flowers always ebracteate . . . . . 39.

39. Fruiting pedicels 8–10 mm long . . . . 40.
+ Fruiting pedicels not longer than 6 mm . . . . 43.
40. Biennials . . . . 41.
+ Perennials, petals broad, cuneate, 7–8 mm long, straw-colored (Central Asia) . . . . 23. **E. gaudanense** Litw.
41. Petals very narrow, oblong-cuneate, 8–10 mm long, golden yellow, siliques 2–7.5 cm long . . . . 42.
+ Petals oblong or oboval, reddish orange, siliques 5–8 cm long . . . . 6. **E. croceum** M. Pop.
42. Siliques wholly hairy. Leaves with 3-partite hairs . . . . 5. **E. strictum** Gaertn.
+ Siliques green, glabrous at angles. Leaves with 4-partite, rarely 3-partite hairs . . . . 4. **E. marschallianum** Andrz.
43. Flowers white, fruiting pedicels 4–6 mm long . . . 39. **E. inense** N. Busch.
+ Flowers yellow, fruiting pedicels 2.5–4.5 mm long, rarely up to 8 mm . . . . 44.
98 44. Stem and leaves pubescent with Malpighian hairs, somewhat mixed with 3-partite hairs (on leaves). Siliques with stellate or radiately 3–4–5 branching hairs . . . . 45.
+ Siliques with 2- and 3-partite hairs . . . . 46.
45. Leaves oblong-linear, acuminate at apex (Kuba Khanate area) . . . . 25. **E. caspicum** N. Busch.
+ Leaves oblong-lanceolate, broad (southern Transcaucasia) . . . . 26. **E. chazarjurti** N. Busch.
46. Siliques thin, slightly flattened, gradually tapering toward style. Fruiting pedicels thin. Leaves linear . . . . 29. **E. leptophyllum** (M. B.) Andrz.
+ Siliques tetragonous, not tapering toward apex. Fruiting pedicels stout . . . . 47.
47. Siliques short, 17–40 mm long, thickened. Style long, 1.5–4.3 mm, rather thin . . . . 28. **E. krynkense** Lavr.
+ Siliques usually long, thin; style 0.5–2.5 mm long, rarely up to 3 mm, thickened . . . . 48.
48. Siliques almost 4-angled to subcylindrical, 4–9 cm long (Caucasus) . . . . 24. **E. substrigosum** (Rupr.) N. Busch.
+ Siliques tubercled, 22–60 mm long (south of the European part of USSR) . . . . 27. **E. cretaceum** Schmalh.
49. Raceme short, subcorymbiform. Stem surrounded by remains of old leaves at base. Style shorter than width of silique, ca. 1 mm long . . . . 11. **E. contractum** Somm. et Lev.
+ Raceme elongating. Tufted plants in the alpine belt of the Lesser Caucasus . . . . 50.
50. Sepals 6.5–9 mm long, petals 15–18 mm long, siliques ascending-erect. Style 4–5 mm long . . . . 9. **E. pulchellum** (Willd.) J. Gay.
+ Sepals 9–11 mm long, petals 18–25 mm long, siliques appressed to axis. Style 3.5–4 mm long . . . . 10. **E. lazistanicum** Rupr.

Section 1. **ERYSIMASTRUM** DC., Syst. II (1821) 494. – Style short or nearly absent. Silique tetragonous or cylindrical, sometimes slightly flattened, never ancipital.

Series 1. Aureae N. Busch. – Forest plants, with oblong-lanceolate leaves. Hairs of various forms.

1. **E. aureum** M. B., Fl. taur.-cauc. II (1808) 117; Ldb., Fl. Ross. I, 190,
99 761; N. Busch in Fl. cauc. crit. III, 4, p. 522. – Ic.: Delessert, II, tab. 66.

Biennial, green plant; all hairs 3–4-partite; stem 45–130 cm high, often branching; leaves oblong-lanceolate, acuminate, emarginate-dentate. Sepals 4–6 mm long, sometimes to 7 mm; petals 9–12 mm long, sometimes to 13–15 mm (var. macranthum N. Busch), golden, oboval; fruiting pedicels 6–15 mm long, divergent or recurved downward (var. reflexum N. Busch); siliques horizontal or ascending, 20–41 mm long, sometimes 10–15 mm long (var. brevisiliguum N. Busch), sometimes unusually long, 50–60 mm (var. siliquosum N. Busch), slightly torulose, occasionally strongly torulose (var. torulosum N. Busch); style thin, 1.5–2 mm long, sometimes very short (ca. 1 mm) (var. brachyrhynchum Bordz.); stigma capitate, broad, bilobate; seeds brown, 1.5 mm long, 0.7–0.9 mm thick. May–June.

Forests, shade near rivers, shrubs, undergrowth, shady forest margins, to 1,800 m. – Caucasus: Cisc., W., E., and S. Transc., Dag. Endemic. Described from the forests along the Terek River, between Mozdok and Kizlyar. Type in Leningrad.

Note. Ancient relic of the Tertiary forest. Its absence in Talysh is noteworthy; probably a relic of the Colchis type.

2. **E. sylvaticum** M. B., Fl. taur.-cauc. III (1819) 441; Ldb., Fl. Ross. I, 190; Schmal'g., Fl. I, 71.

Biennial, stem 0.5–1 m high, branching; leaves covered with generally 3-partite soft hairs, the lower oblong-lanceolate, emarginate-acutely dentate, the upper narrowly lanceolate, tapering at both ends. Sepals pale, oblong, ca. 5–6 mm long; petals ca. 10 mm long, oboval; fruiting pedicels 7–13 mm long, horizontal, sometimes somewhat recurved downward; siliques 2–4.5 cm long, slightly tuberculate; style thin, 2–3 mm long, stigma capitate, broad, bilobate; seeds brown, 1.5 mm long, 0.7–0.9 mm thick. May–June.

Forests and thickets. – European part: M. Dnp., Bl., L. Don, L. V. Endemic. Described from the forests of the Ukraine. Type in Leningrad.

3. **E. pannonicum** Crantz, Stirp. Austr. ed. I (1762) 30. – E. odoratum Ehrh., Beitr. VII (1792) 157; Ldb., Fl. Ross. I, 157; Shmal'g., Fl. I, 72; Kryl., Fl. Zap. Sib. VI, 1360. – Ic.: Rchb., lc. Fl. Germ., No. 4390.

Annual, covered with appressed hairs, on stems and pedicels 2-partite (Malpighian), on leaves and sepals 3-partite, on siliques 2-partite mixed with 3- and 4-partite hairs; stem erect, ridged, simple or branching above, 25–100 cm high; leaves oblong or lanceolate, sparsely and acutely dentate
100 along margins, 2–6 cm long, 3–16 mm broad, the lower obtuse, tapering into a short petiole, the rest sessile, acuminate. Flowers large, bright yellow, fragrant; pedicels thin, 2–4 mm long, in fruit 6–10 mm long; racemes corymbiform subanthesis, later elongating to 8–15 cm and more; petals 13–16 mm long, 4–5 mm broad, with a suborbicular blade one-half as long as the narrow linear claw, as long as calyx; siliques tetragonous, grayish (at sides) with thick cover of appressed hairs, subglabrous and greenish along ribs, deviate somewhat together with pedicels, ascending, 4–6 cm long, ca. 1 mm broad, style 1.5–2 mm long; stigma bilobate. May–June.

Among shrubs. — European part: M. Dnp., Bl. Reported from U.V.; W. Siberia: Irt. (reported from Semipalatinsk). Gen. distr.: Atl. Eur., Centr. Eur., Spain, Bal. Described from Europe. Type in Berlin.

Economic importance. A nectar plant.

Series 2. **Hieracifoliae** N. Busch. — Tall plants with lanceolate leaves, common to open spaces. Pubescence mixed.

4. **E. marschallianum** Andrz. in M. B., Fl. taur.-cauc. III (1819) 441; Ldb., Fl. Ross. I, 190, 761; Kryl., Fl. Zap. Sib. VI, 1358; Voron. in Flora Yugo-Vostoka V, 444. — E. strictum, E. exaltatum Ldb., Fl. Ross. I (1842) 189, 190, 761. — E. hieracifolium N. Busch, Fl. Sib. et Or. Extr. VI (1931) 503 (non L.). — Ic.: N. Busch, Fl. Sib. et Or. Extr. VI (1931) 502 et tab. geogr. 504. — Exs.: HFR No. 1503.

Biennial; stem erect, usually branching above, sometimes very strongly so, sometimes with just few branches, 30—100 cm high, covered with appressed 2-partite Malpighian hairs; lower leaves tapering into petioles, oblong, the upper sessile, lanceolate or linear-lanceolate, all sparsely and finely toothed or entire, covered with 2—3—4, rarely 5-partite, mostly 4-partite hairs. Sepals ca. 5 mm long; petals rather narrow, oblong-cuneate, 8—10 mm long, blade to 3.75 mm long, to 3 mm broad; median nectariferous glands tiny, the lateral large, horseshoe-shaped, hairless; pedicels ascending-erect, 3—9 mm long in fruit; siliques straight, tetragonous or rounded-tetragonous, ascending, covered with 3—4-partite appressed hairs, 2—7.5 cm long, up to 1.8 mm broad, sometimes short (2—2.5 cm long), rounded-tetragonous and appressed to axis; style 0.5—1.5 mm long; stigma bilobate or subentire; seeds brown, oblong, very finely dotted, up to 1.3 mm long. May—August.

Steppes, sandy, solonetzic and stony places, and thickets. — European part: U. Dnp., U. V., M. Dnp., Bl., V.-Don, L. Don, Transv.; Siberia: throughout
101 except for tundra, the western part in particular; Far East: Kamch., Uss. (adventitious); Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., Syr D., T. Sh., Pam. Al. Gen. distr.: Centr. Eur., Mong., Him. Described from Europe. Type in London.

5. **E. strictum** Gaertn., Mey. et Scherb. Fl. Wett. 2 (1800) 451.

Similar to E. marschallianum, distinguished by leaves with 3-partite hairs and siliques completely hairy. — European part: forest regions and Ciscaucasia. Gen. distr.: N. and Centr. Eur. Described from Central Europe.

6. **E. croceum** M. Pop. in Bull. Soc. Nat. Mosc. XLIV, 1—2 (1935) 130.

Biennial; stem usually simple, erect, acute-angular, slightly grayish with appressed 2-partite hairs, sometimes green; leaves lanceolate, acute, rather eroded-dentate, covered with mostly 3-partite hairs (mixed with 2-partite along nerves). Sepals oblong-lanceolate, obtusish, ca. 6 mm long, covered outside with minute 2- and 3-partite hairs; petals reddish orange, 10—12 mm long, oblong or obovate; fruiting pedicels ca. 9 mm long; siliques 5—8 cm long, 1.25 mm thick, tetragonous, erect, gray with fine generally 3-partite hairs; stigma capitate-bilobate; seeds oblong, ca. 2 mm long.

Centr. Asia: T. Sh. Endemic. Described from gravels of the Almatinka River, in the coniferous belt, 1,500–2,500 m. Type in Alma-Ata.

Series 3. **Ibericae** N. Busch. – Predominantly alpine plants of the Caucasus, with mixed pubescence and dentate or pinnate leaves.

7. **E. ibericum** (Adams) DC., Syst. II (1821) 498; N. Busch, Fl. cauc. crit. III, 4 (1909) 525. – Cheiranthus ibericus Adams in Weber et Mohr, Beitr. I (1805) 61, No. 29. – Ic.: Sims, Bot. Mag. tab. 835 (sub C. armeniaco).

Biennial, green; stem 35–80 cm high, sulcate, densely leafy, simple or branching with ascending branches, scantily pubescent with Malpighian hairs; Malpighian hairs on leaves mixed with very few 3–5-partite hairs, (only beneath along midrib and at base); radical leaves runcinate or dentate-lobate, lobes triangular, spreading or recurved backward, cauline leaves oblong-lanceolate, ascending, dentate. Fruiting raceme dense; sepals 6–16 mm long; petals 13–30 mm long (up to 20 mm in var. micropetalum N. Busch, up to 30 mm in var. macropetalum N. Busch), yellow, oboval; fruiting pedicels stoutish, erect, 4–10 mm long; siliques erect, 5–11 cm long, 1.75 mm broad, slightly compressed bilaterally, acutely tetragonous, covered with 3–4-partite hairs; style 2 mm long, thick; stigma bilobate; seeds rufous, oblong, with an appendage below, 2–2.5 mm long,
102 1–1.25 mm broad. May–June. (Plate V, Figure 1 – var. macropetalum N. Busch).

Rocks, gravelly slopes, from 1,500 to 2,800 m, rarely as low as 600 m. – Caucasus: Centr. Caucasus, Dag., E. and S. Transc. Endemic. Described from the snow on Mount Kaishaur. Type in Leningrad.

8. **E. callicarpum** Lipsky, Issl. Sev. Kavk. (1891) 39; Fl. Ciscauc. 251–253 (excl. notam, quae ad E. ibericum DC. pertinet); N. Busch in Fl. cauc. crit. III, 4 (1909) 529.

Biennial, gray-green plant; stem 10–40 cm high, simple or branching, branches ascending, covered with 2-partite (Malpighian) hairs; radical leaves (and leaves of sterile shoots) petiolate, spatulate-linear, eroded-pinnatipartite, lobules narrow, retrorse, acute; cauline leaves linear-lanceolate, narrow, acute, remotely and narrowly notched-dentate, all covered with 2–3-partite hairs. Sepals 7–11 mm long; petals 15–20 mm long, yellow, oboval fold; fruiting pedicels 3–8 mm long; siliques 6–12 cm long, erect or ascending, distinctly acute-tetragonous, gray with 2–3-partite hairs, glabrous and greenish along edges; style 1.5–2 mm long; stigma 2-partite with divergent lobes; seeds oblong. April–May.

Dry slopes, sometimes among shrubs, up to 800 m. Caucasus: Cisc. (W.) and W. Transc. Endemic. Described from the environs of Novorossiisk. Type in Leningrad.

9. **E. pulchellum** (Willd) J. Gay, Erysim. nov. diagn. (1842) 10, No. 21; N. Busch in Fl. cauc. crit. III, 4 (1909) 542. – Cheiranthus pulchellus Willd., Sp. pl. III (1800) 523.

Perennial, green plant, tufted or rootstock multicipital; stem erect, leafy, simple, 15–40 cm high; leaves with 2-partite (Malpighian) hairs mixed with few 3–5-partite hairs; radical leaves petiolate, oblong-spatulate, dentate

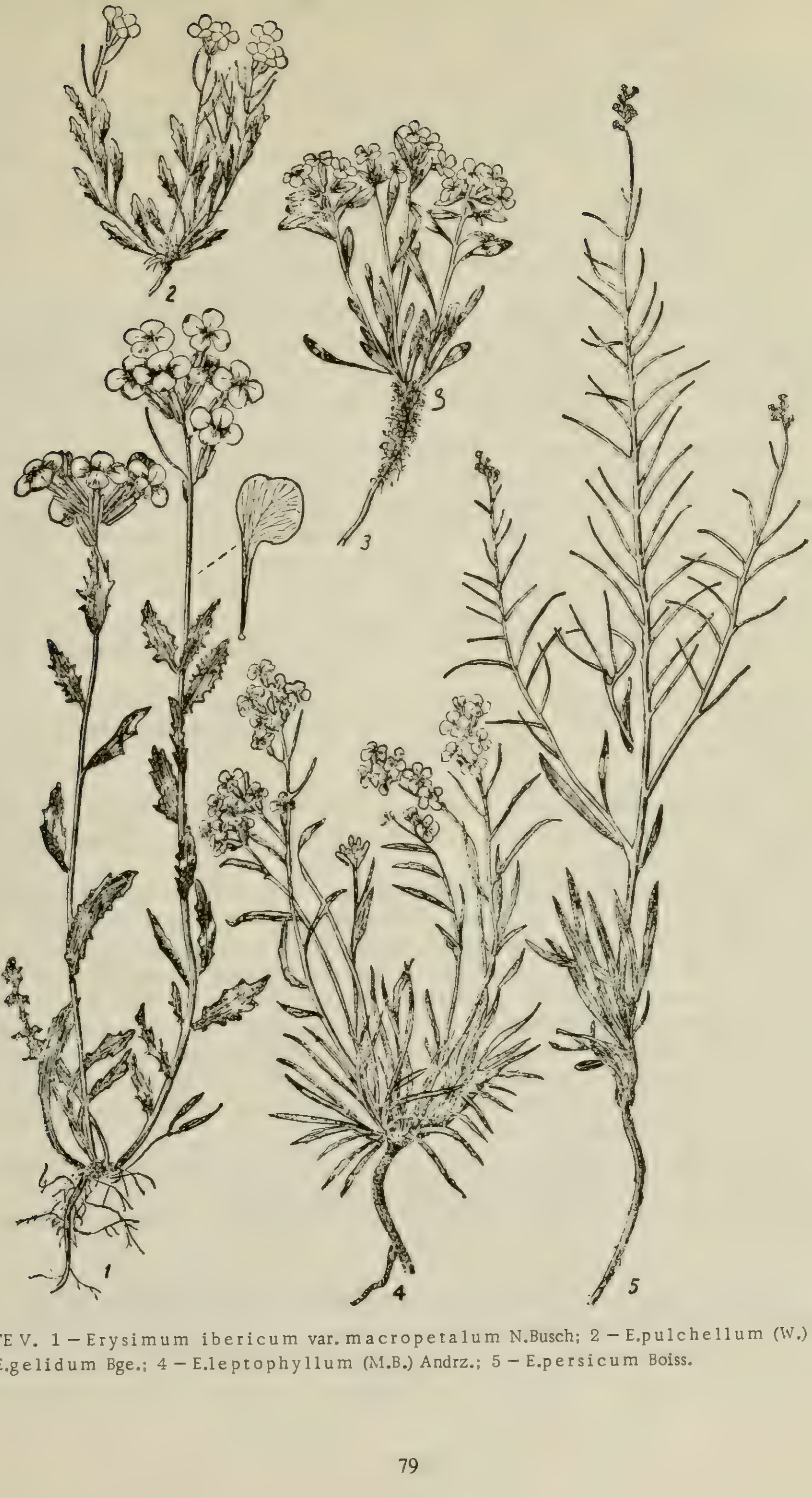

PLATE V. 1 – Erysimum ibericum var. macropetalum N.Busch; 2 – E.pulchellum (W.) J.Gay; 3 – E.gelidum Bge.; 4 – E.leptophyllum (M.B.) Andrz.; 5 – E.persicum Boiss.

to lyrate, cauline leaves sessile, oblong or lanceolate, acutely pectinate-dentate, leaves of sterile shoots lanceolate, often entire, sometimes all leaves equal, oblong-lanceolate, subentire or dentate (var. calverti Boiss.).
105 Sepals 6–9 mm long; petals 12–19 mm long, bright golden yellow; median nectariferous glands bilobate with conical or filiform lobes; fruiting pedicels 3–5 mm long; siliques ascending, thin, 4–4.5 cm long, pubescent with stellate hairs; style 1.5–2.5 mm long, thin; stigma capitate. May–June. (Table V, Figure 2).

The alpine zone. — Caucasus: S. Transc. Gen. distr.: As. Min., Arm.-Kurd. Described from Asia Minor. Type in Berlin.

Note. Could be used as an ornamental plant.

10. **E. lazistanicum** (Rupr.) Lipsky, Fl. Kavk. (1899) 223; N. Busch in Fl. cauc. crit. III, 4 (1909) 543. — Erysimastrum lazistanicum Rupr., Fl. Cauc. (1869) 76. — Sisymbrium pulchellum var. grandiflora Trautv., A. H. P. II (1873) 501. — E. pulchellum var. grandiflorum Boiss., Fl. Or. Suppl. (1888) 41.

Perennial stems many, ascending, leafy, simple, 10–34 cm high; leaves covered with 2-partite (Malpighian) hairs mixed with few 3–5-partite hairs; radical leaves petiolate, oblong-spatulate, dentate to lyrate, cauline leaves sessile, oblong or lanceolate, acutely pectinate-dentate, leaves of sterile shoots lanceolate, often entire. Sepals 9–11 mm long; petals 17–25 mm long, bright yellow; median glands bilobate; fruiting pedicels 4–6 mm long; siliques ascending; thin, 2–3.5 cm long, 1.25 mm broad, pubescent with stellate hairs, appressed to axis; style 3.5–4 mm long, thin, stigma capitate; seeds brown, ca. 2 mm long, ca. 0.9 mm broad. May–June.

The alpine zone, 2,200–2,700 m. — Caucasus: W. and S. Transc. Gen. distr.: Arm.-Kurd. (Lazistan). Described from Lazistan in the Dzhimil' Valley, 1,700 m. Type in Geneva.

11. **E. contractum** Somm. et Lev. in A. H. P. XIII, No. 3 (1893) 30; XVI (1900) 39; N. Busch in Fl. cauc. crit. III, 4 (1909) 543. — Ic.: Somm. et Lev. in A. H. P. XVI tab. IX.

Perennial, short plant, gray-green with 2–3-partite hairs; rootstock woody, branching, producing many-leafed sterile rosettes and flower-bearing stems, densely covered at base with indurate arcuate decaying leaves; leaves crowded, narrowly lanceolate, acutish, gradually tapering into petioles, remotely dentate to subentire; fruiting pedicels erect, one-sixth as long as silique; siliques subtetragonous, convex, crowded at summit in a short corymbiform raceme, somewhat divergent, gray with rather thick pubescence of tiny 2–4-partite hairs; valves with a prominent nerve; style short, narrower than the width of the silique, stigma capitate; seeds rimless or with small rudimentary wing at apex. May.
106

Rocks in the mountainous (forest) zone, rare. — Caucasus: W. Transc. (Adzharistan). Described from Adzharistan, from the rocks of the central mountain zone between the villages of Keda and Khulo. Type in Florence.

Series 4. **Altaicae** N. Busch. — Plants gray with Malpighian hairs. Leaves narrow. Perennials.

12. **E. altaicum** C. A. M. in Ldb., Fl. Alt. III (1831) 153; Fl. Ross. I, 188; N. Busch, Fl. Sib. et Or. Extr. 6, 519; Kryl., Fl. Zap. Sib. VI, 1356. – Ic.: Ldb., Ic. pl. Fl. Ross. tab. 347; N. Busch, l. c., 521 et tab. geogr. 523.

Perennial with a more or less stout rootstock; stems few, ascending, branchless, 20–55 cm high; stems, leaves, pedicels, petioles, and siliques more or less thickly covered with appressed 2-partite (Malpighian) hairs, leaves sometimes gray (var. subincanum Ldb.); leaves linear-oblong, tapering at base, entire, radical and cauline leaves sometimes wider than usual, green and densely and acutely dentate (var. viride Ldb.). Raceme short, later elongating; sepals 7–8.5 mm long, the outer broader, markedly saccate at base; petals gray-yellow, 12–18 mm long, broadly oboval or suborbicular; claw long, narrow, longer than calyx; fruiting pedicels 4.5–17 mm long; siliques very stout, erect, somewhat compressed (parallel to septum), 4–12 cm long, ca. 1.5–2.5 mm broad, with style 1.5–5 mm long (ca. 5 mm long in var. longistylum Litv.) and bilobate stigma; seeds oblong, brown, 1.5–2 mm long, 0.75–1 mm broad. May–July. (Plate VI, Figure 2).

Steppes and southern mountainous slopes. – W. Siberia: Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Balkh., Syr D., Dzu.-Tarb. Gen. distr.: N. Mong. Described from Altai, Ridder area. Type in Leningrad.

Note. Worthwhile cultivating for ornamental purposes.

13. **E. humillimum** (Ldb.) N. Busch in Addenda VII, p. 475. – E. altaicum var. humillimum Ldb., Fl. Alt. III (1831) 153; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 520.

Perennial, tufted; rootstock thick, multicipital; stems many, 4–30 cm high; stems, leaves, pedicels and siliques densely covered with appressed 2-partite (Malpighian) hairs; radical leaves many, all white-pubescent, narrow, linear, entire. Raceme short, then elongating; sepals frequently reddish, 6–8 mm long; petals yellow, 14–16 mm long, 5–6 mm broad; fruiting pedicels 4–8 mm long, sometimes very thick; siliques 3.5–4.5 cm long, 1.5–2 mm broad, style 2–3 mm long, thin, stigma bilobate. June–July.

107 Alpine mountain zone. – W. Siberia: Alt. (Chuya); Centr. Asia: Dzu.-Tarb., T. Sh., Syr D., Pam.-Al. Gen. distr.: Kuldja. Described from the upper reaches of the Chuya River. Type in Leningrad.

Note. Worthwhile cultivating for ornamental purposes.

14. **E. aurantiacum** (Bge.) Maxim., Fl. Mong. I (1889) 65; Kom., Fl. Manchzh. II, 380, 381; N. Busch, Fl. Sib. et Or. Extr. 6, 524. – Cheiranthus aurantiacus Bge., Enum. pl. Chinae bor. (1835) 5; Ldb., Fl. Ross. I, 111. – E. amurense Kitagawa in Bot. Mag. Tokyo LI, No. 604 (1937) 155. – Ic.: N. Busch, l. c., 526 et tab. geogr. 527.

Perennial, completely gray with 2-partite appressed (Malpighian) hairs; stems often solitary, simple or branching, up to 1 m, robust, densely-leafed; leaves oblong-lanceolate, somewhat emarginate-dentate to entire. Sepals 6–11 mm long; petals yellow-orange, 15–25 mm long, 4–9 mm broad, blade suborbicular, claw very narrow; fruiting pedicels 8–15 mm long; siliques declinate, slightly flattened, 4–13 cm long, 1.5–1.75 mm broad; style thick, 1–1.5 mm long; stigma bilobate; seeds brown, 1.5–2 mm long, 1 mm broad, with wing-shaped appendage at apex; the median strand of the elongated epidermal cells of septum broader than in E. altaicum C. A. M. June–July.

Dry stony — mainly southern — slopes, rock streams, dry cliffs, sandy places. — E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu., Uda, Uss. Gen. distr.: E. Mong., Jap.-Ch. Described from North China, Kirin Province. Type in Leningrad.

Note. Worthwhile cultivating for ornamental purposes. Geographically, it belongs to the East Asian element. The species E. altaicum C. A. M. and E. humillimum (Ldb.) N. Busch apparently have the same origin as E. auranticum. The distinctions noted by Kitagawa for E. amurense are insignificant: characters are variable, particularly at the margins of the distribution area of this species.

15. **E. meyerianum** (Rupr.) N. Busch, in Fl. cauc. crit. III, 4 (1909) 533. — Erymastrum meyerianum Rupr., Fl. Cauc. (1869) 82.

Perennial, gray with 2-partite (Malpighian) hairs (other hairs absent); stems almost simple, 4—26 cm high; leaves sublinear, entire or finely denticulate. Sepals 6.5—8.5 mm long; petals 12—15 mm long, yellow, claws slightly longer than calyx; fruiting pedicels 3.5—5 mm long; siliques 3.5—5 cm long, flattened, tetragonous, erect, style 1.5—1.75 mm long; stigma small, emarginate, somewhat broader than style. June.

Alpine zone. — Caucasus: Greater Caucasus (the Elbrus Mountain range, 2,100 m). Endemic. Described from the alpine zone of Elbrus. Type in Leningrad.

Series 5. **Brevistylae** N. Busch. — Green plants with various types of hair. Style short.

108 16. **E. argyrocarpum** N. Busch in Addenda VII, p. 475.

An undershrub; the entire plant covered with densely white-pubescent Malpighian hairs, siliques in particular silvery-silky with thick pubescence; rootstock with few shoots developed into few stems; stems low, 12—20 cm high, slender; leaves linear or lanceolate-linear, acuminate. Sepals oblong, pubescent, ca. 9—10 mm long; petals lemon yellow, obovate-oblong, ca. 18—20 mm long; fruiting pedicels short, 3—5 mm long, ascending; siliques flattened, tetragonous, 2.5—4 cm long, style 3—4 mm long, stigma shortly bilobate; seeds brown, oblong, ca. 2.5 mm long, ca. 0.5 mm broad. June—July.

Rocks and stony places. — Caucasus: Tal. Endemic. Described from Talysh (Gelyadar, Shona-Chol in Zuvant). Type in Leningrad.

Note. A very beautiful, small plant, with silvery fruit.

17. **E. brevistylum** Somm. et Lev. in A. H. P. XIII, No. 3 (1893) 29; XVI (1900) 38; N. Busch in Fl. cauc. crit. III, 4 (1909) 544.

Biennial, green plant, stem with 2-partite (Malpighian) hairs sometimes mixed with 3-partite hairs, leaves with 2—4-partite and siliques with 2—4—5-partite hairs; stem slender, erect, few-branched, 30—100 cm high; lower leaves oblong-spatulate, remotely eroded-dentate or entire, tapering into a petiole, the upper linear-lanceolate, acutish. Sepals 4—5.5 mm long, covered with many 3-partite hairs; petals 6—10 mm long, golden yellow, with cuneate-oboval fold; fruiting pedicels 2.5—6 mm long; siliques completely erect, appressed to axis, somewhat flattened bilaterally, 17—33 mm long, up to 2 mm broad; style 0.75–1.5 mm long, stigma emarginate, up to 1 mm broad; seeds rufous, 1 mm long, 0.7 mm broad, with a rudimentary wing at apex. May.

Stony places of mountain zones, 800–2,000 m. – Caucasus: Cisc. (Pyatigorsk, Elbrus area). Endemic. Described from Karachai, gorge of the Kyukyurtlyu River, 1,600–1,800 m. Type in Florence.

18. **E. cheiranthoides** L., Sp. pl. (1753) 661; Ldb., Fl. Ross. I, 189; Shmal'g., Fl. I, 71; Kom., Fl. Manchzh. II, 380; Kom., Fl. Kamch. II, 191; N. Busch, Fl. Sib. et Or. Extr. 6 (1931) 510 cum tab. geogr.; Kryl., Fl. Zap. Sib. VI, 1357: – Ic.: Rchb., Ic. Fl. Germ., No. 4383 α, β. – Exs.: HFR No. 1458 (f. nanum Zing.).

Annual; stem erect, usually branching, 30–120 cm high, sometimes
109 6–20 cm high (f. nanum B. Zing.), covered with appressed 2-partite (Malpighian) hairs; leaves oblong-lanceolate or lanceolate, in shady places occasionally to 2 cm broad (f. umbrosum Choroschk.), in brightly lighted places only up to 3 mm broad (f. angustifolium N. Busch), tapering at both ends, acute, entire or remotely dentate, sometimes sharply dentate (f. dentatum N. Busch), sparsely covered with appressed 3-partite hairs. Raceme simple or strongly ramose, dense (f. paniculatum N. Busch), or fruiting raceme very loose (f. laxum Bge.); pedicels 2–4 times as long as sepal; flowers small, sepals up to 3 mm long; petals bright yellow, up to 5 mm long, limb broadly oboval, claw narrow, as long as sepal; siliques 0.7–1–2.8–4 cm long, 1.5 mm broad (7–20 mm long in f. brachycarpum N. Busch, 22–40 mm long in f. dolichocarpum N. Busch), covered with 3–4-partite hairs, ascending on subhorizontal pedicels; fruiting pedicels nearly half as long as siliques, 5–16 mm long; style 0.8–1 mm long; stigma emarginate; seeds brown, ca. 0.8–1.3 mm long, ca. 0.4–0.75 mm broad. May–October.

Dry meadows, riverside sands, bluffs, slopes, hills, ravines, forest margins, clearings, fields, near dwellings. – European part: all except the Crimean Peninsula and the Transcaspian Region; Siberia: all; Far East: all; Centr. Asia: Balkh. (also reported from Zeravshan). **Gen. distr.:** all Europe, introduced into N. Am. Described from Europe. Type in London.

Economic importance. A noxious field weed. According to Lenkov, seeds contain 42.72% fatty oil.

Note. Palaearctic Eurasian species.

Series 6. **Gelidae** N. Busch. – Flowers medium in size. Style thin. Pubescence scanty, of 2–3-partite hairs.

19. **E. gelidum** Bge., Pl. Abich. (1858) 4, No. 36; N. Busch in Fl. cauc. crit. III, 4 (1909) 540. – Erysimastrum gelidum Rupr., Fl. Cauc. (1869) 75, 83.

Perennial, tufted; stems few, low, slender, simple, 2–11 cm high, leafy; leaves sparsely covered with 2–3-partite hairs, minute, radical leaves long-petiolate, entire, oblong-spatulate, obtuse, cauline leaves sessile, oblong, acutish, sometimes slightly erose (var. dentatum N. Busch). Flowers mostly bracteate, rarely ebracteate (var. ebracteatum N. Busch); pedicels nearly as long as calyx; sepals 4–7.5 mm long; petals 8–15 mm long, orange, orbicular; nectariferous glands (median) obscure; fruiting pedicels 4–10 mm long; siliques ascending, flattened-tetragonous, ca. 2 cm long, scantily covered with 2–3-partite hairs; style thin, ca. 2 mm long, sometimes 3–4 mm long (var. macrorhynchum N. Busch); stigma 110 capitate, bilobate. May–June. (Plate V, Figure 3).

Rock streams and stony places of the upper alpine zone, 2,500–3,500 m. — Caucasus: S. Transc. Gen. distr.: As. Min. (var. kotschyi Boiss.) and Arm.-Kurd. (var. kotschyi Boiss.), Ararat (typicum). Described from a crater in Alagez. Type in Leningrad.

Note. Could be cultivated as an ornamental plant.

Series 7. **Leptostylae** N. Busch. — Flowers medium in size. Style thin. Siliques with stellate hairs.

20. **E. leptostylum** DC., Syst. II (1821) 494; Ldb., Fl. Ross. I, 187 (part.); Shmal'g., Fl. I, 73; N. Busch in Fl. cauc. crit. III, 4, 545.

Biennial, green plant; stem sparsely pubescent with 2-partite (Malpighian) hairs, leaves and siliques with minute, stellate hairs; stem branching, 30–100 cm high; leaves oblong-lanceolate, remotely denticulate. Sepals 7–9 mm long; petals 15–18 mm long, golden yellow, rounded-obovate fold; pedicels 5–7 mm long; siliques erect, tetragonous, slightly flattened bilaterally, 3–4 cm long, style thin, ca. 2 mm long, stigma capitate; seeds rufous, 1–1.5 mm long, 0.5 mm broad. May–June.

In steppes. — European part: Bl., L. Don, L. V., Crim.; Caucasus: Transc. Endemic. Described from Mt. Beshtau. Types in Leningrad and Geneva.

21. **E. ischnostylum** Fr. et Sint., Bull. Herb. Boiss. Sér. 2, III (1903) 570. — Exs.: Sintenis It. transcasp. persicum, No. 1760.

Perennial, rootstock multicipital, gray-green, many-stemmed; stem pubescent with 2-partite (Malpighian) hairs, leaves with Malpighian hairs mixed with 3-partite rarely 4-partite hairs, siliques with 3–4-partite hairs; stems 40–80 cm high, simple or branching, subcylindrical, leafy throughout; leaves linear-lanceolate, entire, acute, radical leaves tapering at base into a petiole, cauline leaves sessile, smaller. Racemes long; sepals 7–8 mm long, linear-lanceolate, obtuse, covered with Malpighian hairs; petals yellow, 11–12 mm long; pedicels ascending, ca. 3–3.5 mm long in fruit; siliques erect, often appressed to stem, 15–25–50 mm long, 1.25–1.75 mm thick, distinctly tetragonous, style narrower than silique, subglabrous, 1.5–1.75–2 mm long; stigma bilobate; seeds rufous, 1.5–2 mm long. (Plate VI, Figure 4).

Stony slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from Kopet Dagh, at 2,300 m near firn. Types in Leningrad and Geneva, described by Sintenis.

Note. This species differs from the authentic specimen E. persepolitanum 111 Boiss. (Iran, hillside near the ruins of Persepolis, Kotschy Pl. Pers. austr. 1845, No. 261) by having broader leaves, stouter stems (E. persepolitanum is a slender plant), greener vegetative parts, leaf-hairs mixed and not purely Malpighian, siliques with much-branched hairs (not mixed with Malpighian), and larger flowers (sepals of E. persepolitanum 5 mm long, petals 9 mm long).

22. **E. collinum** (M. B.) Andrz. in DC., Prodr. I (1824) 198; Ldb., Fl. Ross. I, 186, 761; Shmal'g., Fl. I, 71 (part.); N. Busch in Fl. cauc. crit. III, 4 (1910) 546. — Cheiranthus collinus M.B., Fl. II (1808) 119; III, 442.

Biennial, gray plant; stems with 2-partite hairs (Malpighian), leaves and siliques with small, stellate hairs; stem cylindrical, few-branched, 30–120 cm high; leaves oblong-lanceolate, obtuse, obscurely emarginate. Sepals 5–8 mm long; petals 10–15 mm long, golden yellow, rounded-oval; median nectariferous glands bilobate; pedicels as long as calyx, 5–8 mm long in fruit; thin; siliques erect, tetragonous, 2–3 cm long, greenish; style thin, 1.5–2 mm long, stigma capitate, emarginate; seeds rufous, ca. 0.8 mm broad. April–June.

Hillsides, slopes, and stony places. — Caucasus: Cisc., W. and E. Transc., Tal. Endemic. Described from the Terek River in the environs of Galugai. Types in Leningrad and Geneva.

Note. A vicarious species in the indicated parts of the Caucasus of both E. leptostylum (western and central Ciscaucasia) and E. brevistylum (species of the Elbrus area).

Series 8. **Gaudanenses** N. Busch. — Woody at base. Flowers small. Hairs of various types.

23. **E. gaudanenses** Litv. in Trav. Mus. Bot. Ac. Sc. I (1902) 33.

Perennial woody at base, gray with simple 2-partite (Malpighian) and branching hairs; stem branching, 20–80 cm high, bearing elongated annual shoots, with rosettes of leaves at base; leaves entire, obtuse, plicate, the lower oblong, recurved, 15–20 mm long, tapering into a petiole, the upper linear. Flowering raceme corymbiform, 10–15-flowered, later elongating, pedicels 3–6 mm long; sepals equal, linear-oblong, rounded at apex, dorsally covered with gray down, glabrous at margin, 4–5 mm long; petals straw yellow, obtuse, cuneate, 7–8 mm long; filaments flattened; ovary slightly compressed bilaterally; fruiting pedicels ascending, 8–10 mm long; siliques 25–50 mm long, 2 mm broad, erect, style 1 mm long, stigma bilobate; septum transparent, with obscure strand. April–May.

Stony mountain slopes. — Centr. Asia: Mtn. Turkm. (Kopet-Dagh). Endemic. Described from mountain slopes near Gaudan. Type in Leningrad.

112 Series 9. **Substrigosae** N. Busch. — Hairs 2–3-partite. Flowers medium in size.

24. **E. substrigosum** (Rupr.) N. Busch in Fl. cauc. crit. III, 4 (1909) 533. — Erysimastrum substrigosum Rupr., Fl. Cauc. (1868) 80.

Perennial canescent plant; leaves and stems with 2-partite (Malpighian) hairs; stems erect, branching, 15–60 cm high; leaves linear or rarely oblong-linear (var. luxurians Lipsky), entire or rarely few-denticulate. Sepals 6–10.5 mm long; petals 11–20 mm long, yellow; fruiting pedicels 2–7.5 mm long, rarely 1.5–2 mm long (var. brachypus N. Busch); siliques ascending, subtetragonous to subcylindrical, 4–9 cm long, covered with 2-partite (Malpighian) or 3-partite hairs, or only with 3-partite hairs at apex; style 1–2 mm long, sometimes 2.5–3 mm long (var. longistylum Rupr.); seeds rufous or brown, 1–2 mm long, 0.4–1 mm broad. April–May.

Dry, frequently calcareous slopes and dry hillsides, 1,900–2,200 m. — Caucasus: Cisc., Dag., central and eastern parts of the Greater Caucasus. Endemic. Described from Dagestan (Gimry, Iol-tau). Type in Leningrad.

25. **E. caspicum** N. Busch in Addenda VII, p. 476.

Perennial canescent plant; stems with 2-partite (Malpighian) hairs, leaves with Malpighian hairs mixed with fewer 3-partite hairs; stems slender, 30–40 cm high, erect or arcuate; leaves oblanceolate-linear, acuminate at apex. Racemes long; flowers medium in size; calyx gray with branched hairs; sepals ca. 6 mm long, oblong, membranous along margin; petals yellow, obovate-spatulate, ca. 11 mm long, blade ca. 3.5 mm long, claw long and narrow; fruiting pedicels stout, ca. 2 mm long; siliques 18–22 mm long, subtetragonous, gray with branched 3–4–5-partite hairs; style ca. 1.5 mm long, stigma bilobate. June.

Caucasus: E. Caucasus (Kuba Territory). Endemic. Described from Azerbaidzhan, Khizy District (formerly Kuba County) near Alty-Agach on Mt. Shishka. Types in Leningrad and Baku.

Note. This species differs from the related E. leptophyllum Andrz. and E. substrigosum (Rupr.) N. Busch by its pubescence, short and stout pedicels, as well as other characters.

26. **E. chazar-jurti** N. Busch in Addenda, VII, p. 474.

Biennial; stems few, 20–55 cm high, angular-sulcate, covered with
113 Malpighian hairs; leaves oblong-lanceolate, pubescent with Malpighian and 3-partite hairs. Sepals oblong, 7–10 mm long, with white membranous rim, outer surface sparsely covered with branching, very minute hairs; petals yellow, oblong-obovate, long-clawed, 13–16 mm long, 3–3.5 mm broad; fruiting pedicels 5–6 mm long, covered with Malpighian and 3-partite hairs; siliques erect, thin, tetragonous, with tiny branched hairs, 20–35 mm long, 1 mm broad. May–June.

Caucasus: S. Transc. Endemic. Described from the Nakhichevan ASSR, from the environs of the village of Nasyrvad, Khazar-Yurt (Karyagin!) and from southern Karabakh, on the northern slopes of Ziarat, subalpine meadow, 2,200–2,300 m (Karyagin and Mikulin!). Types in Leningrad and Baku.

Note. In general appearance it resembles E. marschallianum but differs from it in many other ways; resembling E. caspicum only in pubescence.

27. **E. cretaceum** (Rupr.) Schmalh. in Fl. Sr. and Yuzh. Rossii I (1895) 72. — Erysimastrum cretaceum Rupr., Fl. Cauc. (1869) 76.

Perennial, whitish gray with appressed 2–3-partite hairs; stem 25–40 cm high, branching and densely leafy at base, with reduced sterile shoots; leaves narrowly linear-lanceolate, broader at base, tapering at apex, covered with 2–3-partite hairs. Sepals 7–10 mm long; petals 12–18.5 mm long, fruiting pedicels 6–15.5 mm long, thin; siliques 21.5–60 mm long, thin, tubercled, erect, covered with 2–3-partite hairs; style 0.5–2.5 mm long in fruit, thickened; seeds 2–3 mm long, 0.66–1 mm broad. June–August.

Calcareous outcrops. — European part: V.-Don, L. Don. Endemic. Described from Starobelsk, along the Derkul River. Type in Leningrad.

28. **E. krynkense** Lavrenko in Ukrainsk. Bot. Zhur. III (1926) 18.

Biennial canescent plant; stems 40–80 cm high, erect, simple or branched at summit, sulcate, canescent with 2-partite (Malpighian) hairs; leaves sessile, narrowly linear, entire, covered with 2-partite (Malpighian) hairs mixed with 3-partite hairs. Sepals 6–9.5 mm long; petals 12–17 mm long, bright yellow, rounded-obovate; fruiting pedicels thickened, short, 2.5–5 mm long; siliques 17–39.5 mm long, erect, thickened, subtetragonous, slightly

flattened dorsally, canescent with 2–3-partite hairs; style long, 1.5–4.25 mm long, mostly thin; stigma thickened, emarginate; seeds 1–1.5 mm long
114 and 0.5–0.75 mm broad. July–August.

Calcareous outcrops. – European part: Bl. Endemic. Described from the Krynka River from a chalk slope along Belyi Yar. Type in Leningrad.

Series 10. **Leptophyllae** N. Busch. – Siliques covered with stellate hairs. Leaves linear.

29. **E. leptophyllum** (M. B.) Andrz. in DC., Prodr. I (1824) 198; N. Busch in Fl. cauc. crit. III, 4 (1909) 537. – Cheiranthus leptophyllus M. B., Fl. taur.-cauc. II (1808) 119; III (1819) 442, non Willd., herb. ex Ldb., Fl. Ross. I (1842) 186. – Ic.: Delessert, Ic. sel. II, tab. 13.

Perennial, gray, woody at base; leaf densely pubescent, with 2-partite Malpighian hairs, mixed sometimes with few 3-partite (forked) hairs at leaf apex; siliques covered with stellate hairs, scabrous; stems erect, branching, 9–35 cm high; leaves linear, entire, rarely few-denticulate. Sepals 8–8.5 mm long; petals 12–16 mm long; fruiting pedicels 2.5–7 mm long; siliques ascending, thin, slightly flattened, 27–68 mm long, gradually tapering into the style 1.25 mm long; stigma emarginate. March–May. (Plate V, Figure 4).

Rocks, dry stony places, dry hillsides and slopes, 400–1,200 m. – Caucasus: E. and S. Transc., Tal. **Gen. distr.**: Arm.-Kurd. Described from dry hillsides of the Georgian SSR (Tbilisi). Type in Leningrad.

Note. This species is almost endemic in the Caucasus.

30. **E. caucasicum** Trautv. in Bull. Soc. Nat. Mosc. XLI (1868) 11, 460; Incr. 80, No. 567; N. Busch in Fl. cauc. crit. III, 4 (1909) 530.

Perennial, stem slender, erect, 40–80 cm high, gray with 2–4-partite thick hairs, simple or somewhat branching; radical leaves numerous, linear-lanceolate, dentate or runcinate, cauline leaves narrowly linear, acute, dentate, gray with stellate hairs. Sepals 4.5–8 mm long; petals 8–15 mm long, yellow, claws long, blade obovate; fruiting pedicels 6–30 mm long, remote, gray with stellate hairs; siliques 6–11 cm long, thin, spreading, flexuous, appressed, pubescent with stellate hairs, tetragonous, slightly compressed dorsally; style 1.5–2 mm long; stigma capitate, emarginate; seeds rufous, 1.7–1.9 mm long, 0.8–1 mm broad. April–May.

Caucasus: E. and S. Transc. Endemic. Described from Baku. Type in Leningrad.

115 *31. **E. artvinense** N. Busch in Fl. cauc. crit. III, 4 (1910) 547.

Perennial, gray-green tufted plant; hairs on stem 2–4-partite, on leaf 3–6-partite (stellate), and on siliques 4–6-partite (also stellate); rootstock thick; stems few, very slender, 15–40 cm high; radical leaves oblong-lanceolate, very long-petioled, cauline leaves oblong-linear, all remotely emarginate-dentate. Sepals 4–5.5 mm long; petals yellow, 7–10 mm long, fold oblong-oboval; fruiting pedicels thin, 2–4 mm long; siliques thin, subcylindrical, 20–43 mm long, ascending; style 1–1.5 mm long; stigma tiny, capitate, emarginate; seeds pale brown, 1.25–1.5 mm long, 0.4–0.6 mm broad. March–May.

Rocks and dry slopes. – Arm.-Kurd. Described from the Artvin District (Dzhinal, Artvin, Berta, Shurtum, Lomashen). Type in Leningrad.

Note. Described in view of its possible discovery in the USSR.

Series 11. **Brachycarpae** N. Busch. — Siliques short, stout, tetragonous; hairs 3—5-partite.

32. **E. brachycarpum** Boiss., Fl. Or. I (1867) 195; N. Busch in Fl. cauc. crit. III, 4 (1909) 530.

Biennial, hairs appressed, branching, 3—5-partite; stems ca. 45 cm high, thick, branching with erect branches, acutely angular; leaves oblong-spatulate, incised-dentate, petiolate. Flowers medium in size; fruiting pedicels 3—5 mm long, rigid; siliques erect, thickish, acutely tetragonous, 10—14 mm long, ca. 3 mm broad, with appressed hairs; style 2—2.5 mm long; stigma 2-lobed. June.

Caucasus: S. Transc. Described from Armenia. Type in Geneva.

Series 12. Repandae N. Busch. — Divaricately-branched plant with Malpighian hairs.

33. **E. czernjajevi** N. Busch, nom. nov. — E. divaricatum Czern. in Bull. Nat. Mosc. (1854) 153, non Wallr., Fl. Hercyn. in Linnaea XIV (1840) 603.

Biennial plant, stem and leaves covered with 2-partite (Malpighian) hairs; stem erect, edged, 25—50 cm high, very strongly branching; branches long, subhorizontal; leaves oblong or lanceolate, entire, the lower obtuse long-petiolate, the upper acuminate, often recurved at tip. Sepals ca. 6—7 mm long, oblong, obtuse, pubescent with Malpighian hairs and few 3-partite hairs at apex; petals yellow, 9—12.5 mm long, oblong-obovate, tapering into a claw as long as or slightly longer than calyx; fruiting pedicels 4—11 mm 116 long, subhorizontal or horizontal; siliques glabrous or with few 3- rarely 4-partite hairs, 4—8.5 mm long, 1—1.5 mm broad (thin), sometimes densely hirsute with 2—3—4-partite hairs (var. pseudodivaricatum M. Pop.), valves with thick midrib and thin netted lateral nerves; style 0.5—1 mm long; stigma capitate, 2-lobed; seeds brown, smooth, oblong, 1—1.5 mm long, 0.5—0.6 mm broad. April—May.

Stony and sandy steppes, dry mountain slopes. — W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Kara K., Kyz. K., Balkh., Syr D., T. Sh. Endemic. Described from sandy places in the Dzungaria-Kirghiz Desert near the foot of Mt. Arganata (Lake Balkhash area). Type in Kharkov.

Note. This taxon had to be renamed since E. divaricatum Czern. (1854) is a later homonym of E. divaricatum Wallr. (1840).

34. **E. repandum** L., Amoen. Acad. III (1764) 415; N. Busch in Fl. cauc. crit. III, 4 (1909) 519. — Ic.: Jacq., Fl. Austr. tab. 22; Rchb., Fl. Germ. tab. 62, f. 4384.

Annual, green plant with Malpighian hairs mixed with few 3-partite; stem 7.5—48 cm high, strongly branched, branches divaricate; leaves narrowly lance-linear, eroded-dentate, frequently recurved at tip, radical leaves mostly runcinate. Sepals 4—6 mm long; petals 7—10 mm long; fruiting pedicels 2—5 mm long, thickened; siliques 55—93 mm long, 1—1.5 mm thick, rigid, often tuberculate, style thick, 2—5 mm long, stigma emarginate; seeds rufous, oblong. April—May. (Plate VI, Figure 1).

Steppes, dry outcrops, fields, roadsides, and as a weed. — European part: M. Dnp., Bl., V.-Don, Crim.; Caucasus: Cisc., W., E., and S. Transc., Tal.; Centr. Asia: T. Sh., Mtn. Turkm., Ar.-Casp., Balkh. **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Kashmir. Described from Europe. Type in London.

Economic importance. A noxious weed when found in crops. Seeds contain fatty oil (27.5%).

Note. This species is of Eastern-Mediterranean origin and widely distributed as a ruderal plant.

Series 13. **Versicolores** N. Busch. — Plant with very thin, straight, cylindrical or cylindrical-angular siliques. Hairs of various types.

35. **E. leucanthemum** (Steph.) B. Fedtsch., Fl. Zap. Tyan'-Shanya (1905)
117 No.154; N. Busch, Fl. Sib. et Or. Extr. 6 (1931) 533 cum tab. geogr. — Cheiranthus leucanthemus Steph. ex Willd., Sp. pl. III (1800) 521. — C. versicolor M. B., Fl. II (1808) 119; DC., Syst. II (1821) 182. — Erysimum versicolor Andrz. in DC., Prodr. I (1824) 198; Ldb., Fl. Ross. I, 186, 761; Shmal'g., Fl. I, 73; N. Busch, Fl. cauc. crit. III, 4, 548; Kryl., Fl. Zap. Sib. VI, 1355. — Erysimastrum leucanthemum Rupr., Fl. Cauc. (1869) 75.

Biennial, canescent; stem and leaves pubescent with 2—3-partite hairs, siliques with stellate hairs, scabrous; stems slender, branches erect, 6—65 cm high; leaves linear or oblong-linear, radical leaves numerous, runcinate, lobes triangular, upper cauline entire or subentire, sometimes all dentate (var. dentatum Trautv.), sometimes runcinate (var. runcinatum Trautv.) or more rarely all entire (var. integerrimum Trautv.). Sepals 4.5—6 mm long; petals 8—11 mm long, yellow or white, blade oboval; median nectariferous glands 3-lobed, the lateral horseshoe-shaped; fruiting pedicels 2—4 mm long; siliques erect, slender, cylindrical, 18—45 mm long, 0.4—0.8 mm thick, occasionally all siliques crowded at summit (var. congestum N. Busch); style 1 mm long; stigma emarginate; seeds rufous-brown, 0.8—1.5 mm long, 0.5—0.7 mm broad. April—May. (Plate VI, Figure 3).

Steppes, dry outcrops, sandy and solonetzic places. — European part: Bl., V.-Don, L. Don, L. V., Transv., Crim.; Caucasus: Cisc., Dag., E. Transc., Greater Caucasus; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: the entire area except for the mountainous regions. **Gen. distr.:** As. Min., Iran. Described from northern Iran. Type in Berlin.

36. **E. passgalense** Boiss., Fl. Or. I (1867) 198; Suppl. 38; N. Busch in Fl. cauc. crit. III, 4 (1910) 551.

Biennial, gray; hairs stellate mixed with few 2-partite (Malpighian) hairs on leaves and siliques; stems slender, high, 30—75 cm; radical leaves oblong-spatulate, entire or runcinate, cauline leaves oblong-lanceolate, acute, inconspicuously toothed. Sepals 5.5—6 mm long; petals 10—12 mm long, yellow; median nectariferous glands 2-lobed; fruiting pedicels 2.5—4 mm long; siliques appressed to axis, very thin, cylindrical-angular, 22—34 mm long, 0.6—0.7 mm broad, style 1.25—1.75 mm long, stigma emarginate. May.

Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd., northern and western Iran (up to 2,200 m). Described from the subalpine zone of the Elburz Mountain range near the village of Pasgal (northern Iran). Type in Geneva.

Note. This species is related to E. leucanthemum and represents a more southern Near Asian geographical population. It differs from E. leucanthemum by having a far higher stature, denser pubescence, narrower leaves, very much longer fruiting racemes, longer siliques, and a much longer style.

118 37. **E. persicum** Boiss. in Ann. Sc. Nat. Sér. 2, XVII (1842) 79; Fl. Or. I, 198; N. Busch in Fl. cauc. crit. III, 4 (1909) 538.

Biennial, canescent; hairs of stem and leaves 2-partite (Malpighian) mixed with few 3-partite, siliques covered with stellate hairs; stems divergent, branching out almost from the crown, divaricately branched at base, 20–50 cm high; leaves narrowly linear, entire. Sepals 4.5–5.5 mm long; petals yellow, 8–10 mm long; fruiting pedicels thick, very short, 1–2 (very rarely up to 3) mm long; siliques spreading, 2.5–5 cm long, thin, cylindrical-subtetragonous, gradually angustate into the filiform apex from the broader, truncate base; style 1–1.5 mm long; stigma minute, capitate, emarginate. April–May. (Plate VI, Figure 5).

Dry places. – Caucasus: S. Transc. Gen. distr.: Iran. Described from northern Iran (Azerbaijan). Type in Geneva.

Series 14. **Canescentes** N. Busch. – Flowers small. Canescent plant with Malpighian hairs.

38. **E. canescens** Roth, Catalecta bot. I (1797) 76; N. Busch in Fl. cauc. crit. III, 4 (1909) 531; Fl. Sib. et Or. Extr. 6 (1931) 528; Kryl., Fl. Zap. Sib. VI, 1359. – E. andrzejovskianum Bess., Enum. (1822) 27, No. 838. – Ic.: Rchb., Ic. Fl. Germ. tab. 69, f. 4394.

Biennial, whitish with appressed 2-partite hairs; stems one or more, more or less branched, 30–80 cm high; leaves tapering into a petiole (a long petiole in the radical leaves), oblong, dentate, sometimes eroded-dentate (var. subruncinatum Trautv.), sometimes subentire (var. subintegerrimum Trautv.), cauline leaves linear-oblong or linear, entire; petals yellow 12–14 mm long, blade obovate, claw long, narrow, rather longer than calyx; fruiting pedicels 5–7 mm long; siliques long, thin, 48–70 mm long, up to 1 mm broad, tetragonous, flattened, whitish with 2-partite appressed hairs, green and glabrous at edges, declinate, sometimes curved; epidermal cells of septum occasionally thick-walled (var. pachydermum N. Busch); style short, stigma 2-lobed; seeds rufous brown, 2.25 mm long, 0.85 mm broad. May–June.

Steppes and dry, most often rocky outcrops, rarely in pine forests. – European part: M. Dnp., V.-Don, Transv., Bl., L. Don, L. V., Crim.; Caucasus: Cisc.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: Centr. Eur., Bal., Mong. Described from Europe. Type in Vienna.

Note. A Near Asian species by origin.

119 39. **E. inense** N. Busch in Monit. Jard. Bot. Tiflis, sér. III, livr. 3 (1927) 2; Fl. Sib. et Or. Extr. 6 (1931) 531. – Ic.: N. Busch, Fl. Sib. et Or. Extr. 6, (1931) 532 et tab. geogr. 534.

Perennial, canescent with 2-partite (Malpighian) and very few 3-partite hairs; stems many, 20–35 cm high; leaves tapering into a petiole, radical leaves oblong-lanceolate, long; cauline short-petioled, linear-oblong or linear; all leaves entire or obscurely toothed. Flowers small; sepals 5.5 mm long; petals 8.75–9 mm long, white, blade obovate, 3.75–4 mm long, 3.5 mm broad, claw narrow, linear, 5 mm long; longer stamens slightly longer than the shorter stamens, filaments thin; median nectariferous glands 2-lobed or 2-partite, bearing few Malpighian hairs, the lateral surrounding the shorter stamens; fruiting pedicels 4–6 mm long; siliques 3–6.5 cm long, ca. 1.5 mm broad, ascending, tetragonous, canescent with Malpighian hairs, sometimes slightly curved; lateral epidermal cells of septum with strongly tortuous walls, longitudinal median strand narrow, narrow-celled; style very short, 0.5 mm long; stigma 2-lobed; seeds rufous, 2.5–3 mm long, 1 mm broad. June–August.

Dry stony places. – W. Siberia: Alt. Endemic. Described from Ust-Ini, from the mouth of the Ebel and Argut, tributaries of the Katun River. Types in Leningrad and Tomsk.

Note. Readily distinguished from the related E. canescens Roth by the structure of the septum epidermis, the very short style (0.5 mm long and in E. canescens 2 mm), and the white petals.

40. **E. babataghi** Korsh. Fragm., Fl. Turkest. I (1898) 413.

Biennial or perennial; stems few, 60–80 cm high, simple, erect, somewhat angular, gray with 2-partite (Malpighian) hairs, the whole plant and its leaves gray-pubescent; radical leaves numerous, petiolate, 7–10 cm long, 5–7 mm broad, cauline leaves few, subsessile, all linear-lanceolate, emarginate-dentate. Sepals dorsally carinate, the outer saccate at base, narrowly lanceolate-ovate, the inner linear-oblong, hooded, ca. 7 mm long; petals sulfur-yellow, ca. 11–12 mm long, claw as long as calyx, limb ovate-oblong, half as long as claw; median nectariferous glands flat, often truncate at apex, usually 3-lobed (the central smaller than the lateral) or only 2-lobed, lateral glands forming half-ring; anthers linear-oblong; fruiting pedicels ca. 4–5 mm long, rather thinner than siliques; siliques spreading, 6–7 cm long, ca. 1 mm in diameter, thin, distinctly tetragonous, canescent
120 with 2-partite (Malpighian) appressed hairs (as is the entire plant); style very short, stigma obtuse, slightly emarginate, somewhat narrower than the silique, valves obtusely carinate, 1-nerved. May.

Described from dry stony slopes of the Babatag Mountain range, 1,400–2,000 m. – Centr. Asia: Pam.-Al. Endemic. Type in Leningrad.

41. **E. vitellinum** M. Pop. in Opred. r. Tashkenta, vyp. 2 (1924) 157.

Biennial, canescent plant with 2-partite patent straight hairs; leaves linear-lanceolate or linear, elongate, entire, rarely dentate, the lower petiolate. Flowers bright yellow; fruiting pedicels 3–5 cm long; siliques cylindrical tetragonous, pubescent at edges, with valves wavy-torulose (because of seeds), thin, 5–8 cm long, 0.75–1 mm broad; style 3–4 mm long; seeds brown, ca. 3 mm long, ca. 1 mm broad. Fruit ripening in August.

Centr. Asia: Syr D. Endemic. Described from the Ugam, Karzhan-Tau mountains at the natural boundary of Min-Bulak (thousand streams). Type in Tashkent.

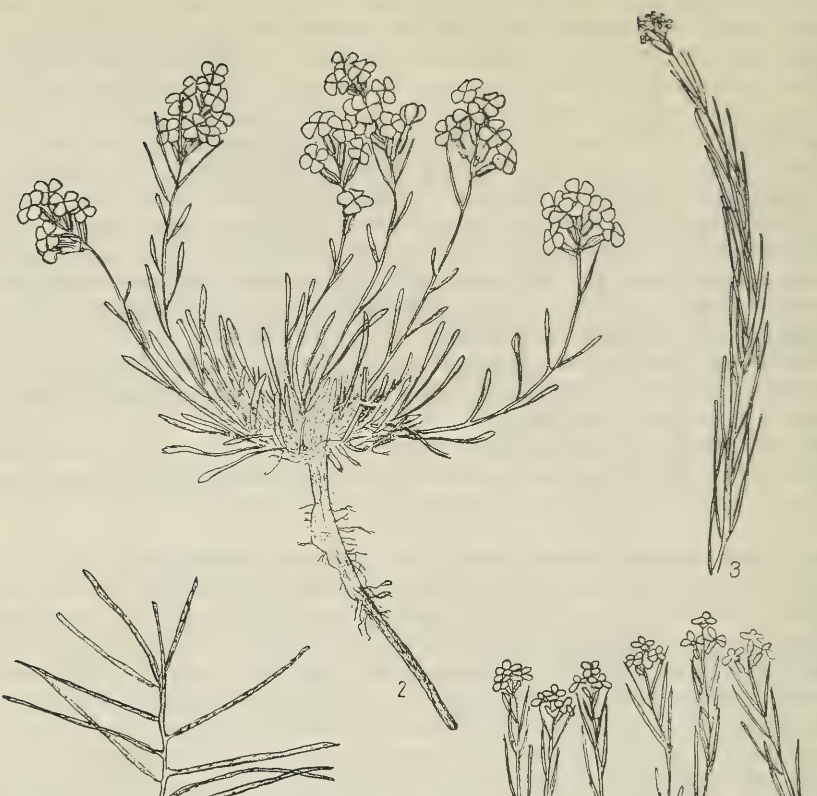

PLATE VI. 1 — Erysimum repandum L. in flowers and fruits; 2 — E.altaicum C.A.M.; 3 — E.leucantheum (Steph.) Fedtsch.; 4 — E.ischnostylum Fr. et Sint.

42. **E. crassipes** Fisch. et May. in Ind. I sem. Horti Petropol. (1835) 27; N. Busch in Fl. cauc. crit. III, 4 (1909) 539.

Perennial, canescent plant with all hairs 2-partite (Malpighian); stems few and from the crown, thin, rigid, 10–50 cm high; leaves narrowly linear, entire. Flowers subsessile; sepals 4–5 mm long; petals 7–9 mm long, yellow; lateral nectariferous glands 2-partite; fruiting pedicels very short, stout, 1.5–3.5 mm long; siliques 20–65 mm long, rigid, gray, canescent, spreading; style 0.8–1.5 mm long; stigma 2-lobed; seeds brown, 1.2 mm long, 0.5–0.6 mm broad. April–May.

Sandy and stony dry hillsides and slopes. – Caucasus: S. Transc., Tal. **Gen. distr.:** As. Min., Syria, Arm.-Kurd., N. Iran. Described from Talysh, Zuvand, 1,100–1,200 m. Type in Leningrad.

Note. A Near Asian species, clearly distinguished from E. persicum by pubescence of silique; silique hairs in E. crassipes are Malpighian, whereas in E. persicum (similar to E. leptophyllum) they are stellate.

Series 15. **Korshinskyanae** N. Busch. – Flowers rather large. Gray plant with Malpighian and 3-partite hairs. Leaves emarginate-dentate.

123 43. **E. badghysi** (Korsh.) Lipsky in herb. – E. verrucosum var. Badghysi Korsh., Fragm. Fl. Turkest. I (1898) 413.

Biennial, gray with 2-partite (Malpighian) hairs; stem erect, 70–100 cm high, strongly branched at summit; radical leaves petiolate, cauline leaves sessile, all linear-lanceolate, emarginate-dentate. Calyx 2-saccate at base, 5–6 times longer than short pedicel, 6–8.5 mm long; outer sepals oval-lanceolate, with prominent keel, the inner linear-oblong, hooded at apex; petals sulfur-yellow, 13–19 mm long, oboval, ca. 6 mm broad; claw longer than calyx; lateral nectariferous glands very minute, no median glands; anthers linear-oblong; fruiting pedicels 3–4.5 mm long, nearly as thick as silique; siliques divergent, rigid, cylindrical-tetragonous, 4–7.5 cm long, ca. 1.5 mm in diameter, not tubercled, gray with appressed mostly 3-partite hairs; style nearly absent, stigma rounded, emarginate, as wide as silique. April–May.

Hilly sandy steppes, dry sandy stony hillside slopes. – Centr. Asia: Mtn. Turkm. Endemic. Described from Badkhyz. Type in Leningrad.

Series 16. **Szovitsianae** N. Busch. – Flowers medium in size. Canescent plant with Malpighian hairs. Leaves entire or dentate.

44. **E. szovitsianum** Boiss., Fl. Or. I (1867) 198; N. Busch in Fl. cauc. crit. III, 4 (1910) 548.

Biennial, canescent with 2-partite (Malpighian) hairs; stems few, from stoutish squamose crown, low, 7–32 cm high; leaves entire or dentate, radical leaves numerous, lanceolate, rather long-petioled, tapering at both ends, acute, cauline leaves shorter. Sepals 8–9 mm long; petals 13–15 mm long, yellow; fruiting pedicels 6 – 7 mm long; siliques ascending, thin, flexuous, tapering at top, 42–60 mm long, 1–1.2 mm broad; style 2 mm long; stigma 2-lobed. May.

Rocks. – Caucasus: E. (Borzhomi) and S. Transc. (Karabakh). **Gen. distr.:** Iran. (northern), Arm.-Kurd. Described from mountain rocks near Lake Urmia. Type in Geneva.

Note. This species occupies a position in between several specific species-groups (E. leptophyllum group, E. leucanthemum group, E. collinum group, and, finally, E. helveticum from Central Europe); it is not, however, closely related to any of these groups.

Series 17. **Sisymbrioideae** N. Busch; flowers very small. Canescent plant with Malpighian hairs. Leaves oblong or lanceolate.

124 45. **E. sisymbrioides** C. A. M. in Ldb., Fl. Alt. III (1831) 150; N. Busch in Fl. cauc. crit. III, 4, 518; Fl. Sib. et Or. Extr. 6, 501; Kryl., Fl. Zap. Sib. VI, 1354. — Ic.: Ldb., Ic. pl. Fl. Ross. tab. 266; N. Busch Fl. Sib. et Or. Extr. 6 (1931) 502 et tab. geogr. 503.

Annual, canescent with 2-partite (Malpighian) appressed hairs, 5—25 cm high, frequently with many stems (at base), erect, branching; leaves oblong or lanceolate, entire, obtuse, tapering at base into a short petiole. Sepals 2—3 mm long; petals oblong, yellow, 3—5.5 mm long; median nectariferous glands very tiny, truncate; pedicels very short, ca. 1 mm long, in fruit 1.5—2 mm long; siliques ascending, straight or slightly arcuate, 1.6—2.5 cm long, densely covered with gray 2-partite (Malpighian) appressed hairs; style thick, not longer than 1 mm; stigma capitate; seeds rimless. April—May.

Clayey solonetzic semideserts. — Caucasus: S. Transc.; Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar. -Casp., Syr D., Balkh. **Gen. distr.:** As. Min., Arm.-Kurd., Iran. Described from solonchaks near Lake Zaisan and solonetzic steppes near Loktevsk. Type in Leningrad.

Series 18. **Lilacinae** N. Busch. — Petals lilac or violet, very rarely yellow.

46. **E. lilacinum** E. Steinb. in Monit. Jard. Tiflis. Nouv. Sér. livr. 3—4 (1927) 13 cum icone, p. 14.

Annual; stem ca. 50 cm high, erect, leafy, angular, very densely pubescent with 2-partite (Malpighian) hairs mixed with very few 3-partite ones; radical leaves obovate-oblong, long-petiolate, up to 6. 5 cm long, 0. 8—1.5 cm broad, blade nearly as long as petiole, strongly emarginate-dentate with 4—5 teeth on each side, cauline leaves sessile, 3—7 cm broad, oblong, emarginate-dentate, all leaves completely covered on both surfaces with 3—4-partite, rarely 5-partite, and very rarely Malpighian hairs. Lateral sepals 5—6 mm long, 1—1.5 mm broad, not hooded at apex, the median 6—7 mm long, 0. 8—1.25 mm broad, hooded at summit, all white-membranous at margin, densely covered with 3—4-partite rarely 5-partite hairs; petals obovalspatulate, 10—12.5 mm long, 3—4.5—5 mm broad, with long (7—9 mm) claw, lilac, outer petals with 3—4—5-partite hairs at the middle; lateral nectariferous glands horseshoe-shaped, the median tridentate, the median tooth much shorter than the others; siliques linear, tetragonous, densely covered with 3—4—5-partite hairs; style short, ca. 1 mm long; stigma 2-lobed. May—June.

Caucasus: S. Transc. Endemic. Described from Zangezur. Type in Leningrad.

125 47. **E. violascens** M. Pop. in Sched. Herb. Fl. As. Med., fasc. IV (1925), No. 91.

Biennial, covered (except for siliques) with appressed 2-partite (Malpighian) hairs; stems solitary or few, rather stout, angular, 15–30 cm high at flowering, to 60 cm high in fruit, branching, leafy; radical leaves linear-lanceolate or broadly linear, numerous, gradually tapering into a petiole at base, acute, usually entire, more rarely emarginate-few-toothed; cauline leaves, similar to radical, sessile. Sepals canescent with 2–3-partite hairs, ca. 8 mm long; petals violet, long-clawed, ca. 14–16 mm long; blade oboval shorter than claw; filaments of longer stamens flattened; median nectariferous glands 2-lobed, large, conical, divergent, lateral glands horseshoe-shaped; style short, ca. 1 mm long; stigma capitate-2-lobed; fruiting pedicels 2–3 mm long, thick; siliques covered with 3–4-partite hair mixed with few 2-partite, gray, spreading, 1.5–5 cm, usually 2–4 cm long, ca. 1.5 mm broad, flattened, tetragonous from prominent midrib of valve, sometimes slightly torulose, with very short style (var. tschimganicum M. Pop.); seeds dark olive in color, somewhat flattened, ca. 1.5 mm long. May.

Stony mountain slopes. — Centr. Asia: Syr D. Endemic. Described from Khodzhent District, Mogol-Tau Mountain, the stony slopes in the Uch-Bakh Valley, and the summit of Bars. Type in Leningrad.

48. **E. francheti** N. Busch, sp. nova in Addenda VII, p. 476. — F. purpureum var. turkestanicum Franchet, Miss. Capus Pl. du Turk. (1883) 20. — E. samarcandicum M. Pop. in schedis herb.

Perennial; stem and leaves with Malpighian (2-partite), siliques with 3–4-partite and some Malpighian hairs; plant with a crown bearing many stems; stems slender, suberect, 30–50 cm high; radical leaves linear, cauline narrowly lanceolate-linear. Racemes loose post anthesis, elongating; sepals oblong, covered with Malpighian hairs, 8–8.5 mm long, with white membranous rim around margins, the lateral saccate; petals violet-purple, becoming pale sometimes even yellowish toward end of flowering, ca. 13 mm long, blade oboval, claw long; fruiting pedicels 3–5 mm long, rather thin, ascending; siliques 12–25 mm long, ascending, tetragonous, hardly flattened, style hardly exceeding their width, ca. 1.5 mm long; stigma capitate-2-lobed. June.

Centr. Asia: Pam.-Al. Endemic. Described from Urmitan, 2,200 m, Chukalan. Type in Leningrad.

126 49. **E. pallasi** (Pursh) Fernald. in Rhodora 27 (1925) 171; Tolm. in Nyt. Mag. LXVIII (1930) 167; N. Busch, Fl. Sib. et Or. Extr. 6 (1931) 535. — Cheiranthus Pallasi Pursh, Fl. Amer. Sept. 2 (1814) 436. — C. Pygmaeus Adams in Mém. Soc. Nat. Mosc. 5 (1817) 114; Kom., Fl. Kamch. II (1929) 193. — Erysimum strigosum Ldb., Fl. Ross. I, 188. — Hesperis Hookeri Ldb., Fl. Ross. I (1842) 174, 759. — Ic.: Hook., Fl. bor.-amar. I, tab. 19 (sub Hesperide pygmaea); N. Busch, l. c., 536 et tab. geogr. 537.

Perennial; tap-root rather stout, 3–4 mm thick, bearing stems 3–35 cm high; stems, leaves, pedicels, sepals, and siliques canescent with appressed 2-partite (Malpighian) hairs; leaves oblong-linear, tapering at base, entire or dentate. Sepals oblong, 6–10 mm long; petals lilac (var. lilacinum N. Busch), rarely pale yellow (var. ochroleucum Tolm.), 10–21 mm long, tapering into a claw, blade oboval, 5.5–7 mm broad; fruiting pedicels

2–10 mm long; siliques linear, flattened, 3–6 cm long, 3 mm broad; style 1–3 mm long; seeds nearly oval, pale brown, not marginate, 2–3 mm long, 1.5 mm broad. July.

Stony places, gravels, pebbly and sandy slopes. – Arctic: Arc. Sib., Chuk., An.; Far East: Kamch., Okh. Gen. distr.: Arc. Am. Described from the western bank of Arctic America opposite Kamchatka.

Note. An ornamental plant, worthy of cultivation.

50. E. **epikeimenum** N. Busch in Addenda VII, p. 474.

Biennial; stems solitary or few, 40–60 cm high, slightly angular, rather slender, often branching at summit, together with leaves covered with 2-partite (Malpighian) hairs; radical leaves linear-lanceolate, petiolate, cauline leaves narrower, sessile, all acute. Sepals 5–6 mm long, covered with Malpighian hairs; petals 11–12 mm long, oboval, tapering into a claw, purple; fruiting pedicels 5–7 mm long; siliques appressed to stem, 15–22 mm long, ca. 2 mm broad, somewhat tapering at apex, tetragonous, covered with Malpighian hairs mixed with a few 3-partite ones; style thin, 2.5–2.75 mm long; stigma 2-lobed. Fl. May, Fr. June.

Centr. Asia: Syr D. Endemic. Described from the southern slope of Zeravshan ridge, from the Akbi-Zerkak Pass, 1,800 m and from Magian-Marguzar. Type in Leningrad.

Note. This species is easily distinguished from E. strictisiliquum N. Busch by its narrower leaves and smaller flowers.

127 51. E. **strictisiliquum** N. Busch in Addenda VII, p. 475.

Biennial; stem simple, angular-sulcate, with Malpighian hairs, 30–40 cm high; leaves lanceolate, short, somewhat dilated toward apex, then becoming abruptly acuminate, tapering at base, radical leaves rosetted, petiolate, cauline leaves sessile, all covered with finely branched hairs. Flowers violet; petals ca. 14 mm long with rounded blade and narrow claw; fruiting pedicels 4–5 mm long, stoutish, appressed to stem; siliques appressed to stem, tetragonous, slightly tapering toward apex, covered with minute branched hairs, 15–20 mm long; style 2 mm long, stigma 2-lobed. Fruiting at end of flowering in July.

Caucasus: S. Transc. Endemic. Described from Karabakh between the villages of Kyrkh and Alty-Takhta. Specimens from the Dolukhanov and Akhverdov collection. Type in Leningrad.

Note. This plant is quite unique in appearance.

Section 2. **CUSPIDARIA** DC., Syst. II (1821) 493. – Style filiform, very long. Silique much flattened, two-edged, valves sharply carinate.

52. E. **cuspidatum** (M. B.) DC., Syst. II (1821) 493; Ldb., Fl. Ross. I, 187, 761; Shmal'g., Fl. I, 73; N. Busch in Fl. cauc. crit. III, 4 (1909) 512. – Cheiranthus cuspidatus M. B., Fl. taur.-Cauc. II (1808) 120. – Ic.: Rchb., Ic. Fl. Germ. tab. 71, f. 4399 (sub Syrenia cuspidata).

Biennial; stem erect, rigid, leafy, sulcate, simple or branching at summit with ascending branches, 20–70 cm high; leaves ovate-lanceolate or oblong, the lowest lyrate, cauline leaves emarginate, large and acutely dentate, upper leaves sessile, with small auricles at base, all leaves gray-pubescent with 3–4-partite hairs. Sepals 5–6.5 mm long; petals 11–13 mm long, yellow, oboval; fruiting pedicels 1.5–4 mm long; siliques appressed to axis, gray with stellate hairs, markedly flattened bilaterally, two-edged, 13–20 mm long, to 3.25 mm broad, rarely 21–31 mm long (var. dolichocarpum N. Busch), more rarely 6–12 mm long (var. abbreviatum N. Busch), varying in width as well, 3.5–5 mm broad in var. latisiliquum N. Busch, or 1.25–1.5 mm broad in var. stenocarpum (Rupr.) N. Busch; valves acutely carinate, keels greenish; style thin, 3.8 [sic] mm long, rarely 8–10 mm (var. longistylum N. Busch); stigma capitate, emarginate; seeds rufous, ca. 1.25 mm long, ca. 0.7 mm broad. May–June.

Up to 2,200 m. Steppes, dry hillsides and slopes. – European part: Bl., Crim., L. Don; Caucasus: Cisc., W. and E. Transc. Gen. distr.: Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from the Crimea and the Caucasus (Tbilisi). Type in Leningrad.

128 Genus 585. **SYRENIA*** ANDRZ.**

Andrz. in DC., Syst. II (1821) 491 et in Ldb., Fl. Alt. III (1831) 160–161.

Sepals erect, the lateral saccate. Petals erect, yellow. Stamens free. Lateral nectariferous glands annular around the shorter stamens, open outwards or closed by a very short stripe, median glands 3-lobed with narrow projection uniting them with the lateral glands. Ovary sessile. Style long, stigma divergently 2-lobed. Silique ovate, oblong, or linear, mostly tetragonous, valves longitudinally scaphoid with acute prominent keel in the middle. Septum thick, epidermal cells oblong with markedly thickened walls. Seeds biseriate. Cotyledons flat, embryo notorrhizal. Hairs appressed, 2-partite. Biennial, with long, narrow (rarely broad, oblong) leaves.

1. Siliques linear, 15–40 mm, 2–2.5 mm broad . . . . 2.
+ Siliques oblong, shorter . . . . 3.
2. Siliques linear, 15–20 mm, petals 18–22 mm long. Flowers borne on very short pedicels . . . . 2. **S. angustifolia** (Ehrh.) Rchb.
+ Siliques linear, 15–40 mm, petals 12–15 mm long. Flowers borne on very distinct pedicels . . . . 1. **S. talievi** Klok.
3. Siliques subsessile, pedicels 1.5–2.5 mm long . . . . 3. **S. sessiliflora** Ldb.
+ Siliques on pedicels 4–8 mm long . . . . 4.
4. Leaves linear, siliques 4–10 (12) mm long, 2–3 mm broad . . . . 4. **S. siliculosa** (M. B.) Andrz.
+ Leaves broadly oblong (up to 0.8–1 cm broad), siliques 15–20 mm long, 3–5 mm broad . . . . 5. **S. macrocarpa** Vass.

1. **S. talievi** Klok., Tr. N. D. Inst. Bot. Khar. Derzh. Univ. (1935) 107.

Biennial plant, 35–90 cm high (usually taller than 50 cm), somewhat branched at summit, densely gray-pubescent with 2-partite and a few 3-partite hairs; leaves narrowly linear, not broader than 2–2.5 mm, more or less conduplicate, entire. Flowers yellow, on distinct but short pedicels 1.5–2 mm long; sepals 7–9 mm long; petals 12–15 mm long; fruiting pedicels

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* Anagram on the word Erysimum [sic].

** Treatment by I.T. Vasil'chenko.

2–5 mm long; silique 15–40 (mostly 25) mm long; style short 3–7 mm long
129 (mostly 4.5–5 mm); seeds oblong, 1.25 mm long, 0.5 mm broad. June.

Calcareous slopes along the Donetz River. – European part: L. Don. Endemic. Described from chalky slopes in the southern part of the Donetz River. Type in Kharkov.

2. **S. angustifolia** (Ehrh.) Rchb., Fl. Germ. (1830–1832) 689; Ldb., Fl. Ross. I, 193; N. Busch in Fl. cauc. crit. III, 4 (1909) 503. – Erysimum angustifolium Ehrh., Beitr. VII (1792) 155; DC., Prodr. I, 196; Shmal'g., Fl. I, 74.

Biennial plant, 30–60 cm high, with erect branching stem, densely appressed-pubescent with 2-partite hairs; leaves narrowly linear. Raceme elongating in fruit; sepals oblong-linear, 8–10 mm long; petals long (15) 18–22 [mm], dilated and rounded at apex, yellow; siliques long, rather flattened-cylindrical, (12) 15–20 (25) long, ca. 2–2.5 mm broad, with a narrow winged keel at the middle of valves borne on pedicels 2–3 (5) mm long, sometimes 5–15 mm (var. korshinskyi Vass.), numerous, erectly appressed to stem, white-grayish, finely pubescent with transversely arranged hairs; style 5–7 mm long; stigma lobes fleshy, divergent; seeds tetragonous, convex on one side, reddish brown, ca. 1.5–1.8 mm long, 1–1.2 mm broad. May–June.

Sands (including marine). – European part: M. Dnp., V.-Don, Bl., Crim., L. V., L. Don; Caucasus: Cisc., W. Transc.; W. Siberia: U. Tob. Gen. distr.: Centr. Eur. Described from Hungary and Transylvania.

3. **S. sessiliflora** Ldb., Fl. Ross. I (1842) 193; Boiss., Fl. Or. I, 209; N. Busch, Fl. cauc. crit. III, 4 (1909) 503; Voronov in Fl. Yugo-Vost. V (1931) 443. – Erysimum sessiliflorum DC., Prodr. I (1824) 196; Shmal'g., Fl. I (1895) 74. – Ic.: Voronov, l. c.

Biennial plant, 40–90 cm high; stem erect, branching, densely covered with 2-partite appressed hairs, grayish-green; leaves linear (subfiliform when dry), long. Racemes elongating in fruit; sepals oblong-linear, with minute hairs, (6) 8–10 mm long; petals bright yellow, 15–20 mm long, dilated at apex to 5–8 mm, tapering below; silique whitish-grayish with small transversely arranged hairs, (5) 6–10 (12) [mm] long, 2.5–3 mm broad, valves with a narrow winged keel at the middle, style 7–9 (12) mm long, stigma with divergent lobes; fruiting silique 1.5–2.5 mm long, thickened; seeds reddish brown, more or less angular, short-elliptic, ca. 1 mm in size. June–July.

Sands.– European part: V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., W. Transc.; W. Siberia: U. Tob.; Centr. Asia: Ar.-Casp. Endemic. Described from the Black Sea area. (Kherson Region). Type in Leningrad.

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4. **S. siliculosa** (M. B.) Andrz. in DC., Syst. II (1821) 491; Ldb., Fl. Ross. I (1842) 193; N. Busch, Fl. cauc. crit. III, 4 (1909) 502; Kryl., Fl. Zap. Sib. VI, 1361; Voronov in Fl. Yugo-Vost. V, 442. – Cheiranthus siliculosus M. B., Fl. taur.-cauc. II (1808) 121. – Erysimum siliculosum DC., Syst. II (1821) 491 et Prodr. I (1824) 196; Shmal'g., Fl. I, 74.–Ic.: Voronov, l. c.

Biennial plant, 40–80 cm high, with erect branching stem, and appressed 2-partite hairs; leaves linear, narrow, often subfiliform (i. e., longitudinally rolled when dry). Racemes short, elongating in fruit; sepals oblong-linear, yellowish, 7–10 (12) mm long, with fine appressed hairs; petals bright yellow, (13) 15–18 (20) mm long, dilated at apex into a suborbicular limb up to 5–8 mm broad, tapering below into a claw; siliques 5–10 (12) mm long, 2–3 mm broad, borne on pedicels (3) 4–5 (6) mm long, ovate or oblong, tetragonous, with a narrow winged keel at the middle of valves, whitish-grayish and appressed-pubescent with densely transversely arranged minute hairs, style 5–10 (12) mm long. June–August.

Various sandy chestnut soils, sometimes in steppe sands. – European part: Bl., Crim., L. Don, Transv., L. V.; Caucasus: Cisc., Dag.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Kara K., Kyz. K., Dzu.-Tarb., Balkh. Endemic. Described from the Prikumskie steppes (L. V.). Type in Leningrad.

5. **S. macrocarpa** Vass. in Addenda VII, p. 477.

Differs from the preceding species by having broadly oblong leaves (up to 0.8–1 [sic] mm broad), siliques 15–20 mm long, 3–5 mm broad, dilated toward base. April–June.

Sandy-stony slopes. – W. Siberia: Alt.; Centr. Asia: Balkh. Endemic. Described from Lake Zaisan. Type in Leningrad.

Genus 586. **BARBARAEA** * BECK.**

Beckmann, Lexic.Bot.(1801) 33; R.Br.in Aiton, Hort.Kew.ed.2, IV (1812) 109; N.Busch in Fl.cauc.crit.III, 4 (1909) 308; Hayek, Crucif.-Syst.(1911) 194.

Sepals equal, not saccate, divergent. Petals yellow. One horseshoe-shaped nectariferous gland at inner side of short stamens, more or less shallowly 3-lobed, open outside; median glands at outer side of shorter stamens, oblong, free. Ovary sessile. Style distinct, short. Stigma short 2-lobed. Fruit a bivalval cylindrical-tetragonous silique. Valves strongly convex with distinctly prominent midrib and distinct lateral nerves. Septum 131 thick, epidermal cells irregularly oblong, with wavy and rather thickened walls. Seeds uniseriate, long-funicled. Cotyledons flat, embryo pleurorhizal. Hairs simple.

Biennials or perennials, leaves generally lyrate-pinnate, glabrous or slightly pubescent.

Genus of 15 species common to nearly all parts of the world, particularly the Mediterranean area and Near Asia. Seven species are found in the USSR. B. praecox R. Br. was recorded by mistake.

1. Siliques erect, appressed to stem. Petals ca. 4 mm long, slightly exceeding the calyx. Stigma subsessile . . . . 1. **B. stricta** Andrz.
+ Siliques generally declinate from stem. . . . . 2.
2. Petals 4–6 mm long. Siliques erect, straight, declinate from stem at end of flowering . . . . 2. **B. orthoceras** Ldb.
+ Petals usually larger, 6–13 mm long, nearly twice as long as sepals. Siliques (when ripe) almost always declinate from stem. Style thin, longer than width of silique (1.5–4 mm long) . . . . 3.

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* From the Latin Barbara – a woman's name.

** Treatment by N.A.Bush.

3. Low plants, 6–20 cm high, very rarely taller. Radical leaves entire. Siliques short (ca. 1.5 cm long), declinate from stem . . . . 7. **B. minor** C. Koch.
+ Tall plants, 30–70 cm high. Radical leaves lyrate or sublyrate (with lateral segments slightly developed) or all leaves (including cauline) entire. Siliques mostly long . . . . 4.
4. Siliques short (15–20 mm long), in dense raceme, the unripe erect, the ripe declinate from stem, straight . . . . 3. **B. vulgaris** R. Br.
+ Siliques long (20–42 mm long), a little bent to arcuate, declinate from stem even when young . . . . 5.
5. Radical leaves lyrate, with 2–7 pairs of lateral segments. Flowering racemes loose . . . . 4. **B. arcuata** Rchb.
+ All leaves entire or sublyrate with a large, ovate, terminal segment, and two small lateral ones, denticulate. Flowering racemes dense . . . . 6.
6. Petals 5–9.5 mm long, sepals 3–4.5 mm long (Transcaucasia). . . . . 5. **B. plantaginea** DC.
+ Petals 12.5–13.5 mm long, sepals 5.5 mm long (Dagestan) . . . . 6. **B. grandiflora** N. Busch.

1. **B. stricta** Andrz. in Besser, Enum. pl. Volh. (1822) 72, no. 1558; Ldb., Fl. Fl. Ross. I, 115; Shmal'g., Fl. I, 55; N. Busch in Fl. cauc. crit. III, 4, p. 310; Fl. Sib. et Or. Extr. II (1915) 187; Kryl., Fl. Zap. Sib. VI, 1925. – Ic.: Rchb., Ic. Fl. Germ. tab. 47, f. 4355; N. Busch, Fl. Sib. et Or. Extr. II, 188 et tab. geogr. 189. – Exs.: A. Kerner, Fl. exs. Austro-Hung., No. 2535. 132

Biennial, glabrous; stem 50–100 cm high, erect, few-branched (mainly at summit); leaves auriculate at base with clasping auricles, the lower petiolate, lyrate, with 1 large oblong-ovate, emarginate-crenate terminal lobe and 2–6 small lateral lobes, sometimes without lateral lobes; median leaves appressed to stem, sessile, lyrate, incised; the upper obovate, emarginate and large-toothed. Branches and flowering racemes somewhat declinate from stem; racemes very dense; sepals 2.5–2.75 mm long; petals ca. 4 mm long, pale yellow; fruiting racemes very dense; fruiting pedicels 2.5–5 mm long; siliques erect, appressed to axis, 20–35 mm long; seeds grayish brown, 1.4 mm long, 1 mm broad. May–July.

Damp meadows and swamps. – European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl.; Caucasus: Dag., Tal.; W. Siberia: Ob., U. Tob., Irt., Alt.; E. Siberia: Yenis., Ang.-Say.; Centr. Asia: Balkh., T. Sh. **Gen. distr.:** Scand., Centr. Eur., W. Med., Bal. (Bulgaria). Described from southern Podolia. Type in Leningrad.

Note. Recording this species as from the Crimea, in Fl. cauc. crit., p. 309, is due to misidentification.

2. **B. orthoceras** Ldb., Ind. sem. Horti Dorp. (1824); Fl. Alt. III (1831) 12 in adnot.; Fl. Ross. I, 114; N. Busch in Fl. cauc. crit. III, 4, 189; Fl. Sib. et Or. Extr. II, 189; Kom., Fl. Kamch. II, 168. – B. vulgaris Kom., Fl. Manchzh. II (1903) 357 (non L.).

Biennial, glabrous; stem 10–100 cm high, erect, few-branched; leaves with clasping auricles at base, the lower petiolate, both lower and middle leaves lyrate, terminal lobe large, oval or orbicular, cordate, rounded, or cuneate, sinuate-crenate at margin; lateral lobes 2–10, small, oblong or ovate; upper leaves sometimes simple, ovate, emarginate, and large-toothed.

Racemes rather dense, sometimes few-flowered (var. kolymensis N. Busch); sepals 3–3.5 mm long; petals 4.5–6 mm long, yellow, sometimes whitish; fruiting pedicels 4–6.5 mm long; siliques 30–50 mm long, erect, declinate from stem at end of flowering, straight; seeds grayish brown, 1.75 mm long, 0.75 mm broad. May–August.

Damp meadows and gravels. Arctic: An.; E. Siberia: Lena-Kol., Dau.; Far East: Kamch., Okh., Uda, Ze.-Bu., Sakh., Uss. Gen. distr.: E. Mong., Manchuria, the Kurile Islands. Described from Baikal between the mouths of the Barguzin and Upper Angara rivers. Type in Leningrad.

Note. B. stricta is a vicarious species in East Siberia and the Far East.

3. **B. vulgaris** R. Br. in Aiton., Hort. Kew. ed. 2, IV (1812) 109; Ldb., Fl. Ross. I, 114; N. Busch in Fl. cauc. crit. III, 4 (1909) 310. – Ic.: Rchb., Ic. Fl. Germ. tab. XLVII, f. 4356.

133 Biennial, glabrous, sometimes stem and leaves hirsute (var. hirta N. Busch); stem 30–70 cm high; lower leaves lyrate, with 2–4 pairs of oblong lateral lobules and a very large terminal one, suborbicular or suboval, cordate or rounded at base; upper leaves obovate, simple, emarginate, obtusely toothed. Racemes dense at flowering; sepals 3–4 mm long; petals 5–7 mm long; fruiting pedicels 3–4.5 mm long; siliques erect, then ascending, not bent, 15–20 mm long; style 2.75–3.5 mm long. May.

Meadows, fields, and slopes; a rare plant. – European part: Lad.-Ilm., Dv.-Pech., V.-Kama, U. V., U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don; Caucasus: Cisc. (Pyatigorsk area), NW Transc., Akhalkalaki. Gen. distr.: Eur. Introduced into S. Africa, N. Am. and Aust. (or probably those were actually the next species, not this one). Described from Kew Gardens. Type in London.

Note. Not found in either the Crimea or Siberia. This plant is far more rare than B. arcuata Rchb. with which it is often mixed. For this reason its general distribution cannot be definitely established.

4. **B. arcuata** Rchb., Flora V (1822) 296; Ldb., Fl. Ross. I, 115; N. Busch in Fl. cauc. crit. III, 4 (1909) 311; Fl. Sib. et Or. Extr. II (1915) 192; Kryl., Fl. Zap. Sib. VI, 1296. – B. vulgaris var. arcuata Shmal'g., Fl. I (1895) 54. – Ic.: Rchb., Ic. Fl. Germ. tab. 48, f. 4357; N. Busch, Fl. Sib. et Or. Extr., II (1915) 193 et tab. geogr. 194. – Exs.: HFR No. 1505, a, b, c.

Biennial, glabrous, sometimes stem, leaves, and petioles more or less pubescent (var. pubescens N. Busch); stem 20–70 cm high; lower leaves lyrate, with 2–4 pairs of oblong, lateral lobules and a terminal one longer than the others, suborbicular or oval, slightly cordate or rounded to somewhat cuneate; upper leaves obovate, simple, emarginate, obtusely toothed, or pinnatisect (var. pinnatisecta Boiss.), sometimes all leaves subentire or emarginate-dentate (var. ardonensis N. Busch). Racemes loose at flowering; sepals 3.5–5 mm long; petals 7–9.5 mm long; fruiting pedicels 4–12 mm long; siliques at the beginning arcuate, when ripe erect or suberect on divergent pedicel, slightly bent, 20–35 mm long or 15–20 mm long (var. brachycarpa N. Busch), glabrous or hairy along nerve (var. eriocarpa N. Busch); style thin, 1.5–3 mm long; seeds 1.5 mm long, 1–1.25 mm broad. April–May.

Meadows, fields, gravels, and damp places, 0–2,000 m. – European part: Lad.-Ilm., Dv.-Pech., U. V., V. -Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl.,

L. Don, Crim.; Caucasus: Cisc., W., E., and S. Transc., Dag., Tal.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh., Mtn. Turkm., Dzu.-Tarb., T. Sh., Pam.-Al. Gen. distr.: Eur., Him., Kashmir, 134 W. Tib., Mong. Introduced in tropical Africa, Australia, and New Zealand. Described from Europe. Type in London.

A very common European plant.

Economic importance. A noxious weed that sometimes is unusually reproductive in crops. Some methods used to control it are mowing at flowering time with a blunt scythe and spraying with a 15% solution of green vitriol. In Transcaucasia the young leaves are used as food instead of garden cress; they have antiscorbutic properties. The seeds contain 33% fatty oil. A nectariferous plant, producing a lot of honey and pollen. Flowers used for dying silk yellow. B. vulgaris and B. stricta possess similar characteristics.

5. **B. plantaginea** DC., Syst. II (1821) 208; Ldb., Fl. Ross. I, 115; N. Busch in Fl. cauc. crit. III, 4 (1909) 316. — Ic.: Delessert Ic. sel. II, tab. 19 (mala).

Biennial, completely glabrous plant, 26—60 cm high; lower leaves ovate-oblong, dentate to sublyrate, lateral lobules minute, serrate; upper leaves oblong, dentate. Racemes dense at flowering; sepals 3—4.5 mm long; petals 5—9.5 mm long; fruiting pedicels 4—10 mm long; siliques 32—42 mm long, thin, ascending, arcuate; style thin, 2—4 mm long. April—May.

Damp places, near streams, in ditches, 1,000—2,800 m. — Caucasus: E. and S. Transc., Tal. Gen. distr.: As. Min., N. Syria, Arm.-Kurd., Iran. Described from "the East." Type in Geneva.

6. **B. grandiflora** N. Busch in Fl. cauc. crit. III, 4 (1909) 317.

Biennial, completely glabrous, 40—60 cm high; lower leaves ovate to ovate-oblong, dentate to sublyrate, lateral lobules minute, serrate; petioles of radical leaves 4—7 cm long; upper leaves oblong to oblong-ovate, dentate. Racemes dense at flowering; sepals ca. 5.5 mm long; petals 12.5—13.5 mm long, intensely golden-yellow; fruiting pedicels 8—12 mm long; siliques thin, ascending, arcuate. June.

Subalpine zone. — Caucasus: Dag. Endemic. Described from Andi-Dagestan (Khonok-Shaitl and the Knupro Pass in the Kodor Range). Type in Leningrad.

7. **B. minor** C. Koch in Linnaea XIX (1847) 55; N. Busch in Fl. cauc. crit. III, 4 (1909) 317.

Perennial, subglabrous, sometimes lower part of stem and radical leaves (with petioles) pilose (var. eriopoda N. Busch), low plant generally 6—20 cm high, rarely up to 36 cm; rootstock horizontal; radical leaves tiny, 4—44 mm 135 long, 3.5—38 mm broad, ovate to ovate-oblong, entire or obsoletely eroded, nerveless; cauline leaves long auricled at base, incised or pinnatipartite or lyrate, the uppermost entire, dentate. Sepals 3.5—5 mm long; petals 7—10 mm long, 2—5 mm broad (at the broadest part); fruiting pedicels 3—9 mm long; siliques ascending, short (15—20 mm long), flattened, style 1.5—2 mm long. April—May.

Meadows, damp stony places, and along streams in the alpine zone, 2,000—3,000 m. — Caucasus: W. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm., T. Sh., Pam.-Al. Gen. distr.: As. Min., Syria, Arm.-Kurd., Iran. Described from Armenia. Types in Leningrad and Berlin.

Genus 587. **RORIPA*** SCOP.**

Scop., Fl.Carniol.Ed.I (1760) 52.

Sepals equal, almost spreading. Petals yellow, oblong-oboval. Filaments edentate. Lateral nectariferous gland at base of stamens, large, annular, emarginate inside, often somewhat open outside, median glands at the outer side of longer stamens, small, free or united with the lateral glands by narrow appendages. Ovary sessile. Style conspicuous, stigma 2-lobed. Fruit a short oblong silique, or ellipsoidal or globose silicle. Valves distinctly convex, nerveless or with just the beginning of a midrib at the base. Seeds numerous, small, biseriate. Cotyledons flat. Embryo pleurorhizal.— Annuals, biennials, or perennials of damp places or growing in water.

Note. Species of Roripa differ greatly in shape, fruit, leaves, dimensions, etc. Apparently such variation is often due to hybridization. Some species (R. hispica, R. globosa) display the uncommon feature of a tetramerous ovary, where four carpels are developed instead of two. For discussions of tetramerism see Fl. Sib. i Dal'n. Vost. II (1915) 196—199 by N. A. Bush.

1. Petals as long as sepals . . . . 2.
+ Petals 1.5—2 times longer than sepals . . . . 5.
2. Fruiting pedicels 1—3 mm long . . . . 9. **R. microsperma** (DC.) Vass.
+ Fruiting pedicels much longer . . . . 3.
3. Silicles globose . . . . 8. **R. globosa** (Turcz.) Vass.
136 + Silicles ellipsoidal or oblong . . . . 4.
4. Plant softly pubescent, silicles short-ellipsoidal, tapering at both ends, 4—5 (8) mm long, 2.5—4 (5) mm broad . . . . . . 7. **R. hispida** (DC.) Britton.
+ Plant glabrous or subglabrous, siliques oblong rarely short-elliptic, 3—8 (10) mm long, 2—3 mm broad, generally cylindrical . . . . 3. **R. palustris** (Leyss.) Bess.
5. Leaves simple, oblong, serrate-dentate . . . . 6.
+ Leaves pinnatisect or pinnatipartite . . . . 7.
6. Leaves auricled . . . . 6. **R. austriaca** (Crantz) Bess.
+ No auricles at base of leaves . . . . 5. **R. amphibia** (L.) Bess. f. indivisa DC.
7. Lower leaves pinnatisect, lobes narrow, subfiliform, the upper leaves simple, dentate . . . . 5. **R. amphibia** (L.) Bess.
+ All leaves pinnatipartite or pinnatisect . . . . 8.
8. Siliques elliptic, 2.5—3 mm long, 1.2—1.8 mm broad . . . . 4. **R. brachycarpa** (C. A. M.) Woron.
+ Siliques oblong or linear, longer . . . . 9.
9. Siliques oblong, 4—6 mm long, 1.8—2 mm broad . . . . 2. **R. anceps** (Wahl.) Grossh.
+ Siliques linear, 7—10 (14) mm long, 1—1.5 mm broad . . . . 1. **R. silvestris** (L.) Bess.

1. **R. silvestris** (L.) Bess., Enum. pl. Volh. (1820) 27. — Nasturtium silvestre R. Br. in Ait., Hort. Kew. ed. 2, IV (1812) 110; N. Busch, Fl. cauc. crit. III, 4 (1909) 327; Kryl., Fl. Zap. Sib. VI, 1298. — Sisymbrium sylvestre L., Sp. pl. (1753) 657; M. B., Fl. taur.-cauc. II (1808) 110.

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* Word of uncertain meaning. O.E.Schulz (Nat.Pflz.17b.1936, 554) regarded this group as the second section of the genus Nasturtium R.Br. and named it Roripa (Scop.) Prantl.

** Treatment by I.T.Vasil'chenko.

Perennial, glabrous plant; stem usually branched at base, erect, sometimes ascending, 20–50 cm high; leaves pinnatipartite-divided or pinnatisect, the lower petioled, the upper sessile, sometimes auricled at base, lobules oblong-ovate to lanceolate, dentate, in upper leaves linear and often entire. Sepals 2–2.5 mm long; petals bright yellow, 4–5 mm long. Racemes elongating in fruit, paniculate, apical (at summit of stem and branches); siliques linear 7–10 (14) mm long, ca. 1–1.5 mm broad, style thin, ca. 0. 75 mm long; fruiting pedicels 8–10 (15) mm long, thin, ascending. May–August.

Damp and marshy places, inundated meadows, and riverbanks. – European part: all regions; Caucasus: Cisc., W. Transc. Gen. distr.: W. Eur., As. Min. Described from W. Europe. Type in London.

137 2. **R. anceps** (Wahl.) Grossh., Fl. Kavk. II (1930) 183. – Nasturtium anceps DC., Prodr. I (1824) 137; N. Busch, Fl. cauc. crit. III, 4 (1909) 328; Kryl., Fl. Zap. Sib. VI, 1299. – Sisymbrium anceps Wahl., Fl. Ups. (1820) 223. – Exs.: HFR No. 1553.

Perennial, glabrous plant with creeping rhizome and erect or ascending stem, 20–80 cm high, sometimes slightly scabrous below (also leaves) and branching at base; leaves pinnatisect (sometimes lyrate), with oblong or lanceolate unevenly dentate lateral lobes, apical lobe of lyrate leaves rather large, suborbicular. Sepals ca. 2 mm long; petals bright yellow, 3.5–4 mm long, 2–3 mm broad; silicles oblong, tapering at both ends, 4–6 mm long, ca. 1.8–2 mm broad, with style 1–2 mm long; fruiting pedicels 7–18 mm long, thin. June–August.

Inundated meadows and damp places. – European part: U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don; Caucasus: Cisc., E .Transc.; W. Siberia: U. Tob., Irt. Gen. distr.: W. Eur., Bal.-As. Min. Described from Sweden.

Note. Considered sometimes as an intermediate between R. austriaca and R. palustris as well as sometimes between other species of Roripa.

3. **R. palustris** (Leyss.) Bess., Enum. pl. Volh. (1820) 27; Voron. in Fl. Yugo-Vost. V (1931) 412. – Nasturtium palustre DC., Syst. II (1821) 191; N. Busch, Fl. cauc. crit. III, 4 (1909) 324; Fl. Sib. et Or. Extr. 2 (1915) 201; Kryl., Fl. Zap. Sib. VI (1931) 1299. – Sisymbrium palustre Leyss., Fl. Halensis (1761) 679. – Ic.: N. Busch, Fl. Sib. et Or. Extr. 2 (1915) 202, 203, et tab. geogr. 206.

Perennial plant, glabrous or with scattered hairs on petioles; stem tall, 10–75 (100) cm, erect or ascending, generally branching; leaves lyrate-pinnatipartite or pinnatisect, with oblong-ovate, dentate lateral lobes and a larger, incised-dentate or lobuled apical lobe, the lower leaves petioled, the upper sessile, auricled at base. Flowers small, pale yellow; sepals 1.5–2 (4) mm long; petals about as long as sepals; siliques oblong, slightly bent, cylindrical, obtuse or rounded at both ends, sometimes subglobose, 3–8 (10) mm long, 2–3 mm broad, with a short style (ca. 0.5 mm), and pedicels 5–10 (12) mm long; seeds ca. 0.75 mm long, ca. 0.5 mm broad. June–August.

Marshes, riverbanks, riparian deciduous forest belts, and sometimes as a weed in gardens. – European part: all regions excluding the Arctic; Caucasus: all regions; W. Siberia: all regions; E. Siberia: all regions;

Far East: all regions; Centr. Asia: all regions. Gen. distr.: nearly all Europe, Ind.-Him., Mong., Jap.-Ch., N. and S. Am., Aust., Egypt. Described from Halle (Germany).

138 4. **R. brachycarpa** (C. A. M.) Woron. in Fl. Yugo-Vost. V (1931) 414. — Nasturtium brachycarpum C. A. M. in Ldb., Fl. Alt. III (1831) 8; Ldb., Fl. Ross. I, 113; N. Busch, Fl. cauc. crit. III, 4 (1909) 327; Kryl., Fl. Zap. Sib. VI, 1300; N. Busch, Fl. Sib. et Or. Extr. 2, 213. — Exs.: HFR No. 904.— Ic.: N. Busch, Fl. Sib. et Or. Extr. 2 (1915) 214 et tab. geogr. 215.

Annual or biennial plant, glabrous or with very minute scattered hairs; stem 20—60 cm high, erect or ascending, usually branching; leaves pinnatipartite or pinnatisect, with long narrow oblong-linear entire or dentate lobes, the lowest leaves lyrate, the upper short-petioled, the rest with longer petioles, not auricled at base. Racemes short, dense; sepals 2—3 mm long; petals bright yellow, 3—4 mm long; silicles broadly elliptic, tapering at both ends, 2.5—3.5 mm long, 1.2—1.8 mm broad, style fleshy, ca. 1 mm long; fruiting pedicels thin, 5—10 mm long, subhorizontally declinate; seeds ca. 0.5 mm long, ca. 0.25 mm broad. May—August.

Banks of rivers and lakes, damp meadows, inundated meadows, and marshes. — European part: U. V., M. Dnp., V.-Don, Transv., L. Don, L. V.; Caucasus: Cisc., S. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp. Endemic. Described from the Irtysh River (Bekun). Type in Leningrad.

5. **R. amphibia** (L.) Bess., Enum. pl. Volh. (1820) 27. — Nasturtium amphibium R. Br. in Ait., Hort. Kew. ed. 2, IV (1812) 110; Kryl., Fl. Zap. Sib. VI, 1301; N. Busch, Fl. Sib. et Or. Extr. II, 214. — Sisymbrium amphibium α aquaticum L., Sp. Pl. (1753) 657. — Exs.: HFR No. 1003.— Ic.: N. Busch, l. c., 216 et tab. geogr. 218.

Perennial plant, glabrous or subglabrous, with hollow ascending stem 30—100 cm long, rooting at base, the lower part often submerged, branching above. Lower leaves large-toothed, those in water usually pectinately pinnatisect with lanceolate lobes, submerged leaves with linear or even filiform long lobes; upper leaves sessile, simple, oblong, irregularly dentate along margin or subentire gradually passing below into pinnate leaves. Sepals 2—3 mm long; petals bright yellow, 4—5 mm long, up to 2—3 mm broad; fruit generally elliptic or globular, 2—4 mm long, 1.5—3 mm broad, style thin, 1—2 mm long; fruiting pedicels subhorizontal-declinate, 5—15 mm long. May—July.

Banks of rivers and lakes, damp meadows, and marshes. — European part: all regions; Caucasus: Cisc., S. Transc.; W. Siberia: all regions; E. Siberia: all regions; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: W. Eur. Described from Centr. Eur. Type in London. 139

Note. Within the range of this species there are many forms, depending chiefly on the degree of plant immersion in water. The terrestrial form of R. a., with oblong, simple, dentate leaves, is usually referred to as f. indivisa DC.; the aquatic form, with upper leaves entire and submerged lower leaves dissected, is called f. variifolia DC. Variations occur in size and shape of fruit — in f. elliptica N. Busch, the fruit is ellipsoidal, in f. orbiculata N. Busch, it is globose.

6. **R. austriaca** (Crantz) Bess., Enum. pl. Volh. (1820) 27. — Nasturtium austriacum Crantz, Stirp. Austr., ed. I (1769) 15; Boiss., Fl. Or. I, 180; N. Busch, Fl. cauc. crit. III, 4, 329.

Perennial plant, glabrous or slightly hairy at base; stem erect, branching, 30—90 cm high; leaves entire, oblong, somewhat spatulate, the lower petioled, the upper sessile, serrate-dentate, auricled at base, cordate-amplexicaul. Racemes many-flowered; sepals ca. 2 mm long; petals bright yellow, ca. 3—4 mm long; silicles globose, 2—3 mm in size, with a fleshy style 1—1.5 (2) mm long; fruiting pedicels thin, 8—10 mm long, subhorizontally declinate. May—August.

Damp places, inundated meadows, and banks. — European part: all regions except for Kar.-Lap. and Dv.-Pech.; Caucasus: all regions; Centr. Asia: Ar.-Casp. Gen. distr.: Centr. Eur., Bal.-As. Min. Described from Centr. Eur.

7. **R. hispida** (DC.) Britton, Mem. Torr. Club V (1894) 169. — Nasturtium hispidum DC., Prodr. I (1824) 139; N. Busch, Fl. Sib. et Or. Extr. 2 (1915) 276; Kom., Fl. Kamch. II, 171. — Tetrapoma barbareaefolium Turcz. in Fisch. et Mey., Ind. sem. Hort. Petr. I (1835) 39; Ldb., Fl. Ross. I, 161. — Ic.: N. Busch, l. c., 208 et tab. geogr. 209. — Exs.: HFR, No. 1305 (sub Tetrapoma barbareifolia).

Biennial or perennial plant, 30—80 cm high, finely pubescent, with erect or ascending stem generally branching at base; leaves pinnatisect or pinnatipartite, long, oblong, auricled at base, the lower leaves petioled, the upper sessile, with lateral lobes oblong-lanceolate, more or less dentate, spreading perpendicularly to petioles, the apical lobe larger, triangular-lanceolate. Racemes apical (at summit of stem and branches); sepals ovate, ca. 2—2.5 mm long; petals pale yellow, 2—3 mm long; silicles short-elliptic, 4—5 (8) mm long, long, 2.5—4 (5) mm broad, with a short (0.5—0.75) fleshy style, bilocular and bivalved (f. genuina N. Busch), sometimes 4-valved, quadrilocular or unilocular due to an abortive septum (f. tetrapoma N. Busch); fruiting pedicels 5—10 (15) mm long, ascending; seeds ovate, 0.75—0.5 mm long.
140 June—August.

Damp meadows with sandy soil and banks of rivers and lakes. — East Siberia: Ang.-Say., Dau., Lena-Kol.; Far East: all regions. Gen. distr.: N. Am. Described from Pennsylvania. Type in Geneva.

8. **R. globosa** (Turcz.) Vass., comb. nova. — Nasturtium globosum Turcz. in Fisch. et Mey., Ind. sem. Hort. Petr. I (1835) 35; N. Busch, Fl. Sib. et Or. Extr. II, 209; Kom. and Klob.-Al., Mal. opred. (1925) 235. — Ic.: N. Busch, l. c., 210, tab. geogr. 211.

Biennial or perennial plant, subglabrous or covered with soft minute hairs; 40—70 cm high; stem erect, mostly branching from base; branches long, ascending, densely leafy; leaves large, long, oblong, the lower lyrate, petioled, upper leaves sessile, auricled at base, dentate (rarely pinnatipartite with oblong lobules). Racemes short, elongating at end of flowering; sepals 2—4 mm long; petals pale yellow, as long as or somewhat longer than sepals; fruit globose, 2—3 mm in size, with style ca. 1 mm long, bivalved (f. bivalvis N. Busch) or (on the very same specimen) 2—3—4-valved (f. tetrapoma N. Busch); fruiting pedicels thin, horizontally declinate, 6—15 mm long; seeds 0.75 mm long, 0.5 mm broad. June—August.

Riverbanks and marshy places. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. Gen. distr.: Jap.-Ch. Described from Dauria. Types in Leningrad and Kharkov.

Note. Tetramerous forms, which appear in several species of Roripa (R. globosa, R. hispida), were separated, then grouped into one species of a monotypic genus (Tetrapoma barbareaefolium F. et M.; formerly these forms were described as Camelina barbareaefolia DC.). Though it is established that tetramerism in R. hispida is hereditary, under conditions unfavorable to growth dimerous fruit instead of tetramerous could develop. In R. globosa, according to Bush (Fl. Sib. i Dal'nego Vostoka, II, 1915, 194–200), this character is even less stable and the number of carpels may vary on the same single plant. In general, (as indicated by Bush) the occurrence of trimerous or tetramerous carpels in Cruciferae is not infrequent. Thus a more thorough investigation is needed in order to establish the genus Tetrapoma or even to treat the tetramerous forms as separate species. Data provided by Academician V. L. Komarov show that only the dimerous forms of R. hispida are distributed in Kamchatka whereas only tetramerous is found in the Amur area.

9. **R. microsperma** (DC.) Vass. comb. nova. – Nasturtium microspermum DC., Prodr. I (1824) 139; N. Busch, Fl. Sib. et Or. Extr. II (1915) 212; Kom. and Klob.-Al., Mal. opred.(1925) 236. – **Ic.**: N. Busch, l. c., 212 et tab. geogr. 213.

141 Annual plant, glabrous, with branching stem; lower leaves lyrate-pinnatipartite, cauline leaves oblong, more or less dentate to pinnatifid, auricled at base. Flowers subsessile; sepals 2–2.5 mm long; petals pale yellow, as long as or somewhat longer than the sepals (sometimes flowers apetalous); silicles oblong, 7–9 mm long, ca. 1.5 mm broad, borne on pedicels 1–3 mm long; seeds reddish brown, short-elliptic to slightly ovate, 0.75 mm long, 0.5 mm broad. July–August.

Shoals and damp places. – Far East: Uda, Uss. **Gen. distr.**: Jap.-Ch. Described from China. Type in Geneva.

Note. Distinguished within the range of this species are f. vegetior Bge. with all leaves broadening at base, upper leaves obovate, incised-lobular or pinnatisect and f. macilenta Bge. with leaves generally tapering toward base, upper leaves linear-oblong; a slender plant branching mostly from base.

Genus 588. **ARMORACIA*** GAERTN.-MEY.-SCHERB.**

Gaertn.-Mey.-Scherb., Fl. Wetterau. II (1800) 426; Hayek, Crucif.-Syst. (1911) 218; N. Busch, Fl. Sib. et Or. Extr. II (1915) 218.

Sepals equal, divergent; petals white, clawed; filaments without appendages; one nectariferous gland incomplete-ring-shaped (open outwardly) at base of each of shorter stamens, joined with the median glands to form one complete ring. Ovary sessile, style short, stigma short, 2-lobed. Fruit oblong and rather long or a short, ovate, inflated silicle with convex valves, nerveless; epidermal cells of septum multangular, with straight walls. Seeds biseriate; cotyledons flat, embryo pleurorhizal. – Perennial herbs with large leaves.

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* From Armorica or Armorique – Celtic name for Brittany.

** Treatment by N.A.Bush.

A boreal genus of 4 species, 2 of which grow in the Soviet Union.

1. Petals 9–12 mm long, very rarely 8 mm. Silicles 1–3 cm long . . . . 1. **A. sisymbrioides** (DC.) Cajand.
+ Petals ca. 6 mm long. Silicles 5–6 mm long . . . . 2. **A. rusticana** Gaertn.-Mey.-Scherb.

1. **A. sisymbrioides** (DC.) Cajand., Alluv. (1903) 33 et sequ. Verz. 174; N. Busch, Fl. Sib. et Or. Extr. II (1915) 219; Kryl., Fl. Zap. Sib. VI, 1302. – Cochlearia sisymbrioides DC., Syst. II (1821) 368. – Ic.: Gmel., Fl. III (1758) tab. 57 (sub Cochlearia heterophylla); N. Busch, l. c., 221 et tab. geogr. 222.

142 Perennial, with a stout, long root, to 1 cm [long]; stem erect, branching above, 40–120 cm high, ribbed, together with leaves completely glabrous; leaves glaucescent-green, the radical often very large, oblong or oblanceolate, tapering gradually toward base, then decurrent along petioles, obtusely serrate-dentate, in plants from inundated areas lower cauline leaves pinnatifid or pinnatipartite into linear entire lobes, in plants from uninundated areas the lower cauline leaves entire; middle and upper leaves ovate, oblong, or lanceolate, sessile, markedly cordate, amplexicaul, irregularly dentate, sometimes entire. Fruiting racemes elongated, paniculate, apical (at summit of stem and branches); pedicels 10–30 mm long; sepals 3–5 mm long; petals white, obovate, 9–12 mm long, short-clawed, rounded at summit, 2–2.5 times as long as sepals and stamens; silicles oblong, 12–29 mm long, 3–6.5 mm broad, often somewhat recurved, equal to or slightly shorter than pedicels; stigma broad, 2-lobed; valves rather convex, silicle compressed (perpendicularly to septum); septum incomplete, forming a rim along margin; style very short, 0.75–1.75 mm long, 1.25 mm broad; seeds reddish-grayish brown, punctate, ca. 1.5 mm in diameter. May–July.

Inundated meadows, near water, and sometimes in water. – W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Yenis., Lena-Kol., Dau.: Far East: Sakh. Endemic. Described from the Lena River. Type in Geneva.

Economic importance. Cultivated in Siberia for the roots, which are eaten as a substitute for real horse-radish, Armoracia lapathifolia. The so-called varieties of Trautvetter, namely, var. turczaninoviana and var. czekanovskiana, are forms (entire or pinnate) resulting from environmental influence on the leaves and have no systematic significance.

2. **A. rusticana** (Lam.) Gaert.-Mey.-Scherb., Fl. Wetterau II (1800) 426; Hayek, Crucif.-Syst. (1911) 166; N. Busch, Fl. Sib. et Or. Extr. II (1915) 233; Kryl., Fl. Zap. Sib. VI, 1303. – Cochlearia armoracia L., Sp. pl. (1753) 648; Ldb., Fl. Ross. I, 159; N. Busch in Fl. cauc. crit. III, 4, 175. – C. rusticana Lam., Fl. Franc. II (1778) 471. – Armoracia lapathifolia Gilib., Fl. lithuan. II (1781) 359. – Nasturtium armoracia Fries, Corpus Florarum Prov. Suec. (1835) Fl. Scand. 65; Shmal'g., Fl. I, 54. – Ic.: Rchb., Ic. Fl. Germ. fig. 4262.

Perennial, with stout, fleshy root; stem erect, branching, 0.5–1.5 m high;
radical leaves very large, oblong or oblong-ovate, crenate, cordate, lower
cauline leaves pinnatipartite, middle leaves oblong-lanceolate, the upper
linear, subentire. Sepals ca. 3 mm long; petals ca. 6 mm long, white, short-
143 clawed; fruiting racemes elongated, pedicels erect; silicles oblong-ovate,
inflated, 5–6 mm long, one-fourth to one-fifth as long as pedicels; valves
netted-veined, without midrib, cells with 4 seeds, style very short. June.

Cultivated and wild in the European part of the USSR, the Caucasus, and Siberia. Grows wild on riverbanks and in damp places. — European part: U. Dnp., U. V., V.-Don, Transv., V.-Kama. **Gen. distr.**: Nearly all Europe, introduced into N. America. Described from Europe. Type in London.

Economic importance. A vegetable. The root and sap extracted from it make up one of the best antiscorbutic remedies.

Genus 589. **NASTURTIUM*** R. BR.**

R.Br.in Ait.Hort.Kew.ed.2, IV (1812) 110.

Sepals equal, divergent. Petals clawed, oblong-oboval, white. Filaments edentate. Large horseshoe-shaped nectariferous gland at base of shorter stamens, open outwardly, median glands absent. Ovary sessile. Style conspicuous. Fruit a slightly recurved cylindrical dehiscing silique, with convex valves, nerveless. Septum thin, epidermal cells irregularly multangular, more or less oblong, with thin walls. Seeds biseriate, flat. Cotyledons flat. Embryo pleurorhizal. Hairs simple. — Aquatic perennials with pinnately-divided leaves.

1. **N. officinale** (L.) R. Br., l. c.; DC., Prodr. I (1824) 137; Ldb., Fl. Ross. I, 111; Boiss., Fl. Or. I, 178; N. Busch, Fl. cauc. crit. III, 4, p. 321. — Dictyosperma Olgae Rgl. et. Schmalh., Izv. O-va Lyub. Est., Antr. i Etnograf., XXXIV, 2 (1882) 2. — Pirea Olgae Dur., Ind. gen. IX (1888) 494. — Sisymbrium Nasturtium L., Sp. pl. (1753) 657. — Exs.: Herb. Fl. As. Med., No. 85.

Perennial, glabrous plant; stem stout, hollow, ascending, and rooting, 10–60 cm high; leaves pinnatisect, broad-petioled, with 2–7 pairs of oblong or ovate, more or less emarginate-crenate lateral lobes, asymmetrical at base, and a larger apical lobe, round-ovate, undulate-dentate. Sepals 2–3 mm long; petals white, 4–5 (6) mm long; filaments violet; fruit linear, often slightly curved and compressed, (10) 15–20 mm long, ca. 1.8–2.5 mm broad (ca. 1–1.75 mm broad in var. Olgae (Rgl. et Schmalh.) N. Busch), with a short fleshy style, and capitate slightly 2-lobed stigma; fruiting pedicels 10–20 mm long, horizontally spreading; seeds biseriate, small, slightly alveolate, reddish brown, pleurorhizal. May–August. 144

Marshes, stagnant pools, by springs, and by "aryky" (irrigation ditches). — European part: M. Dnp., U. V., V.-Don, Transv., Bl., L. Don, L. V.; Caucasus: all regions; Centr. Asia: all regions. **Gen. distr.**: Nearly all Europe, W. Asia to India; introduced into N. Am. and Abyssinia. Described from Europe and North America. Type in London.

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* Alteration of nasitortium, from the Latin nasus — nose and torquere — to twist.

** Treatment by I. T. Vasil'chenko.

Genus 590. **DENTARIA*** (TOURN.) L.**

Tourn.ex L., Syst.ed.I (1735); L., Sp.pl.(1753) 653.

Sepals equal, erect. Petals clawed, white, straw-colored or purple, large. Silique narrowly lanceolate, flattened, valves flat, nerveless, twisting elastically during dehiscing of silique. Seeds oval, thick, flattened, uniseriate. Cotyledons on slightly concave petioles, margins more or less plicate. Embryo pleurorhizal. — Perennials, usually with horizontal cylindrical rootstock bearing bulblets and scales.

Of the 16 species which occur in the Soviet Union six are Tertiary.

1. Rootstock very short, ca. 0.5 cm long, producing many filiform shoots thickened at tip into tubercles with very minute and few scales. . . . . 7. **D. tenuifolia** Ldb.
+ Rootstock cylindrical, horizontal, squamose. . . . . 2.
2. Stem with numerous alternate leaves, upper leaves entire, lower pinnate with 5—7 leaflets. Black bulblets in axils of leaves . . . 1. **D. bulbifera** L.
+ Stems with 2—3 leaves, usually forming a whorl. Leaves ternate or pinnate or (more rarely) bipinnate. Without axillary bulblets . . . . 3.
3. Leaves ternate, leaflets lanceolate, acutely serrate. Petals ca. 22 mm long . . . . 4.
+ Leaves pinnate or bipinnate . . . . 5.
4. Leaves sparsely denticulate (European part) . . . . . 3. **D. glandulosa** W. K.
+ Leaves densely denticulate with narrow small teeth (Siberia) . . . . 4. **D. sibirica** N. Busch. 147
5. Petals whitish, pale yellow when dry, 8—10 mm long. Stem low, 8—17 [cm], rarely up to 27 cm high. Leaves 2—3 subbipinnate. Leaflets small, entire. . . . . 6. **D. bipinnata** C. A. M.
+ Petals violet, dark purple or (rarely) pink, 12—20 mm long. Stem low or tall. Leaves pinnate, 3 on a stem . . . . 6.
6. Stem 20—35 cm high. Leaves large, with 5—7 leaflets. Leaflets large, densely dentate. Petals violet, rarely pink, 12—20 mm long . . . . 2. **D. quinquefolia** M. B.
+ Stem low, 7.5—20 cm high. Leaves small, radical with 5 leaflets, cauline with 7—11. Leaflets small, entire or slightly and superficially notched. Petals dark purple, rarely pink, 12—18, usually 16 mm long. . . . . 5. **D. microphylla** Willd.

1. **D. bulbifera** L., Sp. pl. (1753) 653; Ldb., Fl. Ross. I, 130; Boiss., Fl. Or. I, 164; Suppl. 32; N. Busch in Fl. cauc. crit. III, 4 (1909) 368. — Cardamine bulbifera Crantz, Class. Cruciform. (1769) 127; Shmal'g., Fl. I, 51; Schulz Monogr. (1903) 351.

Perennial; rootstock 7—20 cm long, branching at summit, scales deltoid, 2—4 mm long, 3—4 mm broad at base; stem 40—70 cm high, erect, simple, leafless below, 10—12-leaved above, glabrous; lower leaves pinnate, with 1—3-pairs of leaflets; leaflets oblong-lanceolate, dentate; upper leaves entire; all leaves ciliate, bearing blackish or dark green deciduous bulblets in axils. Racemes usually 6—12-flowered; sepals 5—6 mm long, oblong, obtuse; petals pink or dark violet, rarely white, cuneate-oboval, 12—15 mm

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* From the Latin dens — tooth (due to dentate scales of rhizome shoots).

** Treatment by N. A. Bush.

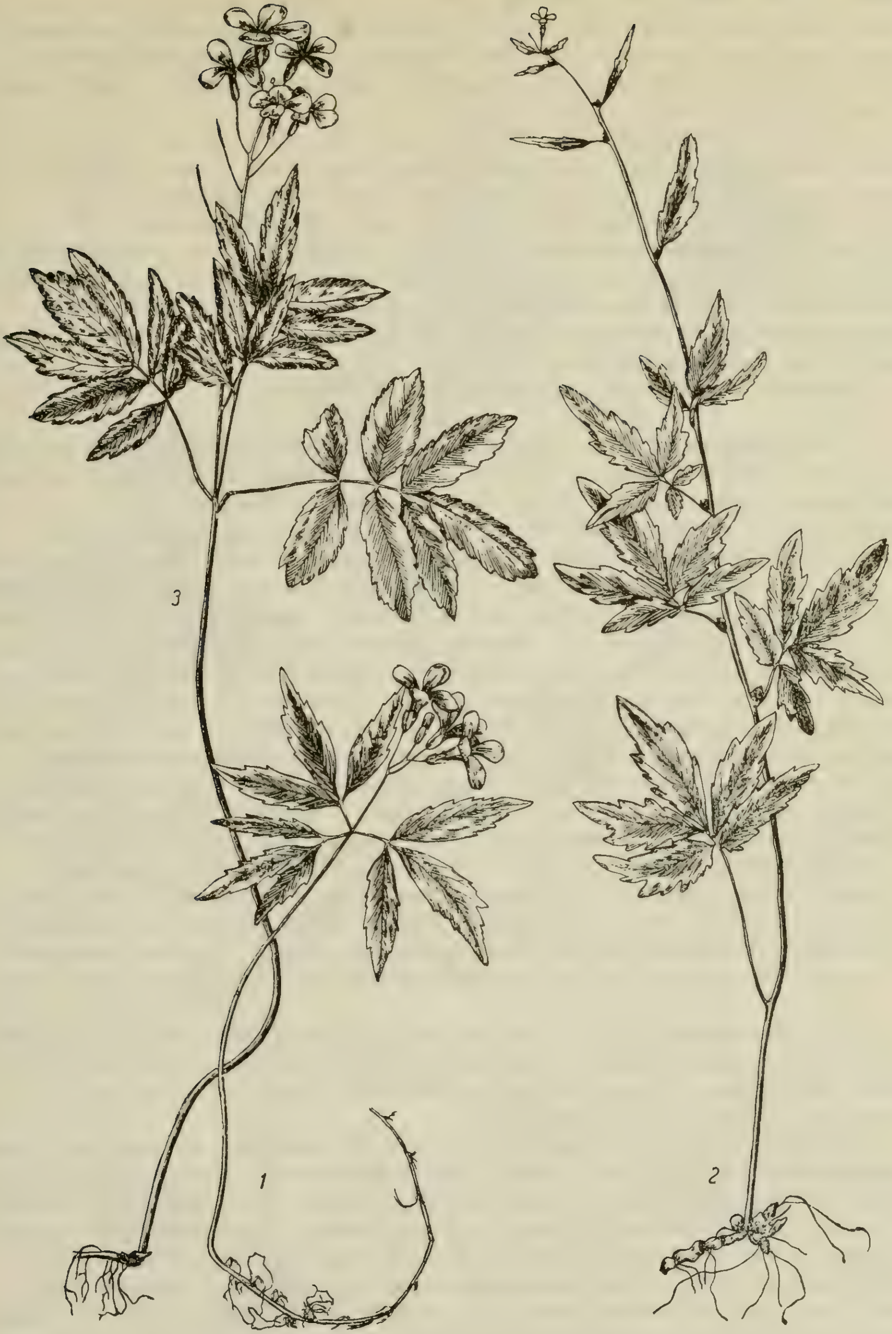

PLATE VII. 1 – Dentaria glandulosa W.et K.; 2 – D.bulbifera L.; 3 – D.quinquefolia M.B.

rarely up to 18 mm long; fruiting pedicels ascending; siliques very rarely ripen, ascending, 20–35 mm long, 2.5 mm broad, tapering into a subconical style 3 mm long; seeds 2.5 mm long, 1.5 mm broad, 0.6 mm thick, oblong-ovate, yellowish-grayish brown, reddish along margin, shiny. April–June. (Plate VII, Figure 2).

Forests. – European part: Lad.-Ilm., U. Dnp., M. Dnp., Bl., U. V., V.-Don, Crim.; Caucasus: Cisc., W. Transc., Dag. (littoral), E. Transc. (Kuba). **Gen. distr.:** Atl. Eur., Scand., Centr. Eur., Med. (western and eastern), Bal.-As. Min., Iran. Described from Europe. Type in London.

Note. Varies in pubescence (var. pilosa Waisb. with stem very short and densely pilose below), color of petals (var. lactea (Wirtg.) O. E. Schulz–petals white), size of flowers (var. macrantha N. Busch with petals 17–18 mm long), serration of leaves (var. ptarmicifolia DC. with upper leaves more acutely serrate).

Economic importance. Roots contain astringents.

148 2. **D. quinquefolia** M. B., Fl. taur.-cauc. II (1808) 109; III (1819) 436 Ldb., Fl. Ross. I, 129; N. Busch in Fl. cauc. crit. III, 4 (1909) 363. – Cardamine quinquefolia Shmal'g., Fl. I (1895) 51. – Ic.: Delessert, Ic. sel. pl. II (1823) tab. 33. – Exs.: HFR No. 1501 (f. grandiflora Schulz).

Perennial; rootstock 12–20 cm long, branching, scales triangular, rounded at apex, appressed, 2–3 mm long, 2–3 mm wide at base; stem 20–35 cm high, erect, simple, glabrous, leafless below, 3-leaved above; leaves pinnate into 2–3-pairs of leaflets, usually whorled, leaflets lanceolate-linear, obtusely dentate, very short-ciliate along margin. Raceme very dense, 6–15-flowered; sepals 4–5 mm long, oblong, obtuse at apex; petals violet, rarely pink, 12–15, rarely up to 20 mm long (f. grandiflora Schulz), obovate-cuneate; fruiting pedicels ascending, barely thickened at tip; siliques ascending, 35–50 mm long, 2.5 mm broad, tapering into a style 3–4 mm long, rarely 1–2 mm long, thicker (f. brevistyla Schulz); seeds 2.25 mm long, 1 mm broad, 0.75 mm thick, oblong, brown. April–May. (Plate VII, Figure 3).

Shady forests, usually on limestone (0 to 1,000 m). – European part: U. Dnp., M. Dnp., Bl., U. V., V.-Don, L. Don, Crim.; Caucasus: Cisc., Dag., W. and E. Transc., Tal. **Gen. distr.:** Bessarabia, As. Min., Arm.-Kurd. Described from forests in the Crimea and Caucasus. Type in Leningrad.

Note. An ancient type, typically distributed in areas of Tertiary relicts.

3. **D. glandulosa** W. et K., Pl. rar. Hung. III (1812) 302; DC., Syst. II (1821) 273; Ldb., Fl. Ross. I, 129. – Cardamine glandulosa Shmal'g., Fl. I, (1895) 50; Schulz, Monogr. Cardam. (1903) 581. – Ic.: WK., l. c., tab. 272; Rchb., Fl. Germ. f. 4315; Hegi 807.

Perennial; rootstock filiform, 0.75–1 mm in diameter, whitish, beset with lanceolate scales 0.5–1 cm distant from each other, 3–5 mm long, 1.5 mm wide at base; stem erect, simple, ca. 20 cm high at flowering, ca. 35–40 cm in fruit; radical leaves few, long-petioled, ternate, with ovate acute leaflets; cauline leaves 3, whorled, petiolate, 5–9 cm long, ternate, with narrowly lanceolate, serrate leaflets sometimes entire at base, the terminal one 40–75 mm long, 9–16 mm broad. Raceme more or less 6-flowered; sepals
51 7–8 mm long, oblong; petals purple, large, ca. 22 mm long, oblong-cuneate, rounded or slightly emarginate at apex, abruptly tapering into a linear claw; inner stamens 7 mm long, outer 6.5; anthers narrowly oblong, yellowish;

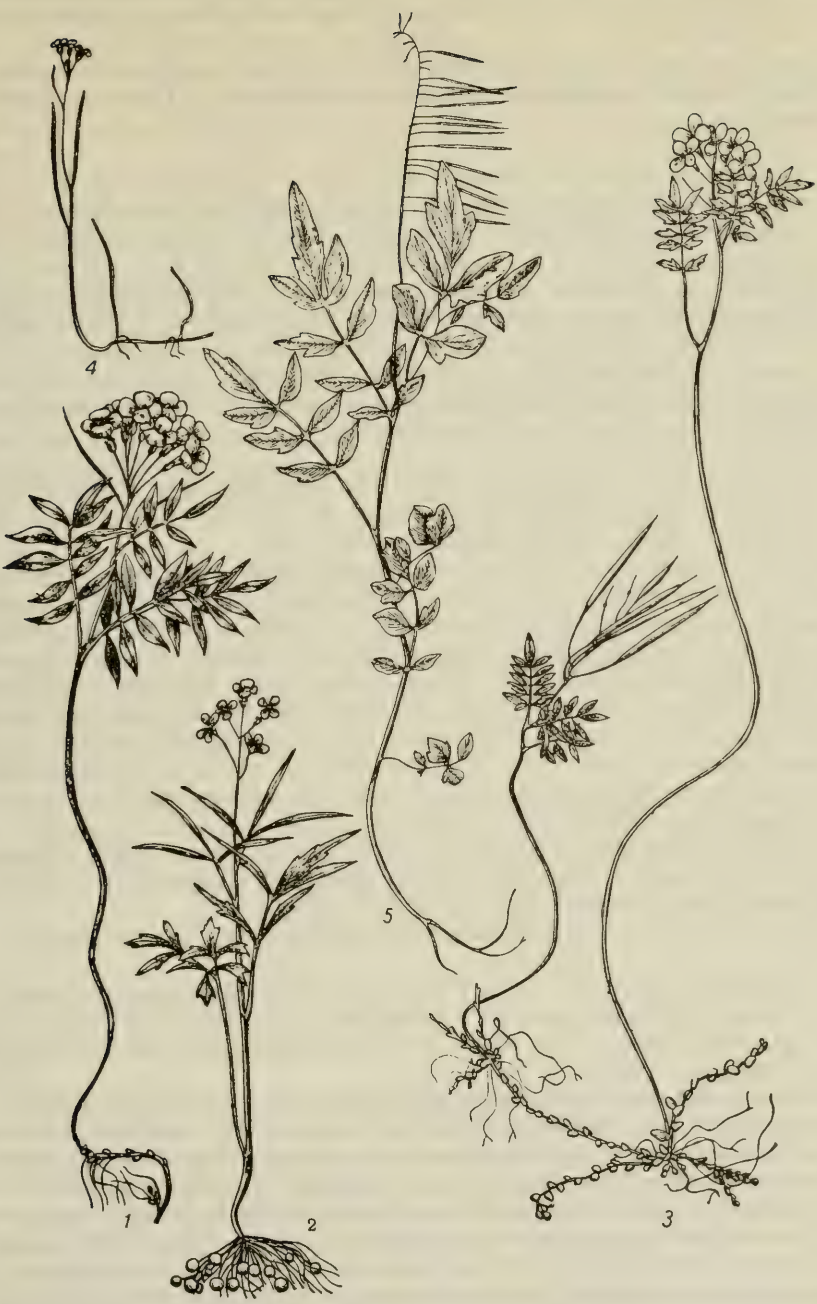

PLATE VIII. 1 – Dentaria microphylla Willd.; 2 – D.tenuifolia Ldb.; 3 – D.bipinnata C.A.M.; 4 – Cardamine victoris N.Busch ; 5 – C.pectinata Pall.

siliques 25–50 mm long, ca. 2 mm broad; style 5–7.5 mm long; seeds 2.5 mm long, 2 mm thick, angular-ovate, dark grayish brown, shiny. April–May. (Plate VII, Figure 1).

Forests. – European part: M. Dnp., Bl. **Gen. distr.:** Centr. Eur., Bal. Described from the environs of Rozenberg in Hungary. Types in Vienna and Budapest.

4. **D. sibirica** (Schulz) N. Busch, comb. nova. – Cardamine glandulosa ssp. sibirica Schulz, Monogr. Cardam. (1903) 381; N. Busch, Fl. Sib. et Or. Extr. II (1915) 229; Kryl., Fl. Zap. Sib. VI, 1311. – **Ic.:** N. Busch, l. c., 230 et tab. geogr. 231.

Perennial, resembling D. glandulosa W. et K. and distinguished by its closely denticulate leaves with narrow, smaller, and often recurved teeth, and by its geographical disjunction. Fl. April–May.

Forests. – W. Siberia: Alt.; E. Siberia: Ang.-Say. Endemic. Described from Anos (Altai) and from the Upper and Lower Kena, tributaries of the Abakan River (Sayans). Type in Leningrad.

5. **D. microphylla** Willd., Sp. pl. III (1800) 479; DC., Syst. II (1821) 279; Ldb., Fl. Ross. I, 130; N. Busch in Fl. cauc. crit. III, 4 (1909) 360. – Cardamine microphylla Schulz, Monogr. (1903) 342.

Perennial; rootstock 20–50 cm long, usually simple, scales narrowly ovate, obtusish, subappressed, ca. 4 mm long; stem low, 7.5–20 cm high, ascending, glabrous, branchless below, 3–4-leaved above; radical leaves long-petioled, with 2-pairs of leaflets, cauline leaves with shorter petioles and 3–5 pairs of leaflets; leaflets all linear or linear-oblong, entire or somewhat dentate, very shortly ciliate. Raceme dense, corymbiform, 10–20-flowered; sepals 4–5 mm long, oblong, obtuse; petals dark purple, rarely pink, oboval-cuneate, 12–18 mm, mostly 16 mm long. Fruiting pedicels suberect, thickened at tip; siliques 35–40 mm long, with hardly visible fruit-stalks, style ca. 3 mm long, thick. June–July. (Plate VIII, Figure 1).

Damp hillside taluses in the upper alpine zone, 2,000–3,200 m. – Caucasus: Center of main range. **Gen. distr.:** Kurd. (Ararat). Described from the alpine zone of the Georgian SSR. Type in Leningrad.

Note. Should be cultivated as an ornamental plant. A rare species.

6. **D. bipinnata** C. A. M., Verz. Pflz. Cauc. (1831) 179; Ldb., Fl. Ross. I,
152 130; N. Busch in Fl. cauc. crit. III, 4 (1909) 362. – Cardamine bipinnata Schulz, Monogr. (1903). – **Ic.:** Rupr., Fl. Cauc. (1869) tab. V, F. 1 et 2; Somm. et Lev., Enum. tab. VII, f. A.

Perennial; rootstock 2.5–4 cm long, stemmed at summit, scales suborbicular, ca. 2.5 mm in diameter, concave; stem 8–16.5 rarely up to 27 cm high, ascending-erect, simple, leafless below, 2–3-leaved above, (together with pedicels) soft-pilose; leaves minute, almost ovate, bipinnatisect; leaflets crowded, small, oblong, entire, ciliate, shortly appressed hairy at tip. Raceme dense, ca. 10-flowered; sepals 2.5–3 mm long, ovate, obtuse; petals whitish, straw-colored when dry, oboval-cuneate, 8–10 mm long; fruiting pedicels ascending, thickened at tip; siliques glabrous or hirsute (var. lasiocarpa Schulz), 12–45 mm long, 2–2.5 mm broad, indistinctly stalked, tapering to a thick style 3–5 mm long; seeds rufous, ovate, nearly 2 mm long, ca. 1.25 mm broad. June–July. (Plate VIII, Figure 3).

Hillside taluses, stony slopes, and moraines. — Caucasus: Alps of the main range, 2,000–3,200 m. Endemic. Described from the alpine zone of Yungvishe near Elbrus. Type in Leningrad.

Note. A rare species. As far as it is possible to judge from the available material, var. lasiocarpa is distributed only in Bol'shoi Karachai, and the typical form is found from Bermamut and Elbrus to Dagestan.

7. **D. tenuifolia** Ldb., Mém. Ac. 5 (1815) 547; Ldb., Fl. Alt. III (1831) 43; Fl. Ross. I, 130. — Cardamine tenuifolia Turcz., Catal. in Bull. Soc. Nat. Mosc. (1837) 57, No.38; Fl. baic.-dah. I (1842) 120, No.114; Shmal'g., Fl. I, 51; Kom., Fl. Manchzh. II, 362; N. Busch, Fl. Sib. et Or. Extr. II (1915) 231; Kom., Fl. Kamch. II, 174; Kryl., Fl. Zap. Sib. VI, 1311; Ic.: N. Busch, l. c., tab. colorata et nigra 233 et tab. geogr. 235.

Perennial; rootstock with shoots 0.5–4 cm long; tubercles whitish, flat, rounded, ca. 0.5 cm in diameter, rarely reniform; stem 7–30, usually ca. 20 cm high, generally simple, with 1–3 close leaves above, glabrous; rhizome-leaves 4.5–12 cm long, ternate or with 5 leaflets, the terminal leaflet rounded or short-ovate, 5–17 mm long, 4–13 mm broad, crenate-lobular or deeply dissected into 3 segments; cauline leaves 2–8 cm long, petiolate or subsessile, with 3 or 5 leaflets; leaflets linear-lanceolate, entire or rarely dentate, the terminal 10–50 mm long, 1–5 mm broad. Raceme subcorymbiform, loose in fruit; fruiting pedicels 8–10 mm long; sepals ca. 3.5 mm long, oblong, rounded at apex; petals pink or lilac, rarely white, narrowly obcuneate, rounded at apex, dentate at base, 6.5–9 mm long, sometimes 14–15 mm long (var. grandiflora Trautv.); siliques 22–25 mm
153 long, 1.5 mm broad; style thin, 2.5–4 mm long; seeds small, 1.2 mm long, up to 1 mm broad, 0.4 mm thick, oblong-elliptic, rufous. April–July. (Plate VIII, Figure 2).

Damp and shady places, meadows, forests, and among shrubs. — European part: V.-Don, V.-Kama; W. Siberia: Alt.; E. Siberia: Yenis., Lena-Kol., Ang.-Say., Dau.; Far East: Ze.-Bu., Okh., Uda., Uss. Endemic. Described from Altai, from Ridder. Type in Leningrad.

Genus 591. **CARDAMINE*** L.**

L., Sp.pl.Ed.I (1753) 653; Gen.pl.Ed.5 (1754) 295.

Sepals equal, erect or divergent. Petals white or pink, clawed. Filaments without appendages. Lateral nectariferous glands forming half-rings around the shorter stamens, the median glands outside the longer stamens, not connate with the lateral. Silique linear or linear-lanceolate, flattened; valves flat, without midrib, with few longitudinal indistinct nerves or with inconspicuous venation; valves detached from septum and fold elastically during maturity. Stigma slightly 2-lobed. Seeds uniseriate, elliptic or generally rectangular, mostly flattened, yellow-grayish brown. Cotyledons flat, embryo pleurorhizal. Hairs simple. — Annual, biennial, or perennial, with leaves mostly pinnate, rarely simple.

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* From the Greek kardamon — cress.

** Treatment by N. A. Bush.

A genus of more than 100 species; 27 species occur in the Soviet Union, mainly from the Black Sea and Far Eastern areas.

1. Siliques lanceolate-linear. Silique with beaklike style 4–6 mm long (rarely 1–3 mm long) carinate on both sides (narrowly winged). . . . . 27. C. graeca L.
+ Siliques linear. Beaklike style keelless (not winged) . . . . 2.
2. Annuals and biennials, without rootstock. Flowers small; petals 2–3 mm long, rarely up to 5 mm long . . . . 3.
+ Perennial plants with leaves rosetted, tufted, or with a long rootstock . . . . 8.
3. Siliques short, 1–2 cm long, on spreading pedicels, erect. Leaves with 5–8 pairs of leaflets. Glabrous plant . . . . 10. C. parviflora L.
+ Siliques longer, 2–3 cm long, mostly pubescent plant . . . . 4.
4. Leaves with 1–3 pairs of leaflets. Leaflets sparsely hairy above and along margins . . . . 5.
+ Leaves with 2–9 pairs of leaflets. Stem-base and lower leaves glabrous . . . . 7.
154 5. Terminal leaflet broad, much larger than lateral, sometimes nearly all leaves reduced to 1 terminal leaflet (Far East) . . . 9. C. regeliana Miq.
+ Terminal leaflet hardly larger than lateral . . . . 6.
6. Stamens 4. Pedicels and siliques ascending. Leaflets of radical leaves suborbicular-ovate, the upper oblong-linear. . . . 6. C. hirsuta L.
+ Stamens 6. Siliques erect on ascending pedicels. Leaflets of upper leaves very similar to the lower . . . . 7. C. flexuosa With.
7. Cauline leaves with 5–9 pairs of leaflets. Siliques 1–1.1 mm broad, style in fruit usually 0.75 mm long (very rarely up to 1 mm long) . . . . 5. C. impatiens L.
+ Cauline leaves 2–4 pairs of leaflets. Siliques narrower, 0.75 mm broad. Style longer, 1.5–3 mm long . . . . 4. C. pectinata Pall.
8. Flowers small, petals 2–4.5, rarely up to 6 mm long. Rootstocks short . . . . 9.
+ Flowers large, petals 3–15 mm long. Rootstock or tufts well-developed . . . . 11.
9. Stem glabrous, base of petiole few-ciliate. Leaves 1–4-paired. Pedicels (at flowering) merely 1.5–2 mm long. Raceme reduced . . . . 8. C. umbellata Greene.
+ Leaves simple, entire plant glabrous or with few bristles . . . . 10.
10. Rosette leaves suborbicular or obovate . . . 17. C. sachokiana N. Busch.
+ Leaves elliptic . . . . 24. C. bellidifolia L.
11. Rootstock cespitose, not creeping . . . . 12.
+ Rootstock creeping, long . . . . 13.
12. Leaflets of upper and middle cauline leaves narrowly oblong or linear, lower cauline and radical leaves with usually orbicular-reniform leaflets. Petals 10–12 mm long, lilac-pink or rarely white. Style thin, not thickened below stigma . . . . 19. C. pratensis L.
+ Leaflets of cauline leaves oblong. Petals white, rarely lilac. Style of ripe silicle thick, thickened below stigma . . . . . 20. C. dentata Schultes.
13. Rootstock with tufts of many decayed petioles. Flowers purple (northeastern Siberia) . . . . 26. C. purpurea Cham. et Schlecht.
+ Rootstock without tufts . . . . 14.

55 14. Leaves simple . . . . 15.
+ Leaves pinnate . . . . 16.
15. Leaves palmately lobed . . . . 25. **C. pedata** Rgl. et Til.
+ Leaves linear . . . . 22. **C. victoris** N. Busch.
16. Plant low, 6–15 cm high. Radical leaves with 1–2 pairs of leaflets, cauline with 2–3 pairs. Petals 5–10 mm long . . . . 21. **C. hyperborea** Schulz.
+ Plant 15–100 cm high . . . . 17.
17. Leaflets of lower leaves usually acute or long-acuminate at apex, 7–20-notched or serrate-crenulate, usually large, 2.5–10 cm long . . . 18.
+ Leaflets of lower leaves rounded at tip, entire, sometimes crenate or angularly toothed . . . . 20.
18. Stem and leaves densely and shortly hairy . . . . 19.
+ Plant glabrous . . . . 3. **C. yezoensis** Maxim.
19. Stem rather flexuous. Leaflets long-acuminate. Flowers white. Siliques 18–25 mm long . . . . 2. **C. leucantha** (Tausch) Schulz.
+ Stem just slightly flexuous. Leaflets obtuse or acute at apex, not long-acuminate. Flowers usually lilac-pink. Siliques 25–40 mm long . . . . 1. **C. macrophylla** Willd.
20. Petals 5–8 mm long, always white. Plant glabrous. Leaves with few pairs of leaflets (1–3) . . . . 21.
+ Petals large, 8–15 mm long, white or pink. In many species leaves with many pairs of leaflets . . . . 23.
21. Leaflets minute, equal, 3–5, rarely 7–11 (northeastern Siberia) . . . . 23. **C. minuta** Bge.
+ Leaflets 1–2 (very rarely 3) pairs. Terminal leaflet much larger than lateral . . . . 22.
22. Style 1.5–2 mm long (western Transcaucasia) . . . . 11. **C. lazica** Boiss. et Bal.
+ Style 2–3 mm long (Transbaikalia and the Far East) . . . . 12. **C. lyrata** Bge.
23. Raceme at flowering short, corymbiform, flowers white. Leaflets oblong, dentate. Style thin, subulate . . . . 14. **C. amara** L.
+ Raceme not corymbiform. Flowers lilac, rose, white or (rarely) straw-colored . . . . 24.
156 24. Raceme at flowering loose and even more so later. Flowers white. Stem ascending from a decumbent base. Siliques usually pilose . . . . 15. **C. prorepens** Fisch.
+ Raceme at flowering dense. Siliques glabrous . . . . 25.
25. Leaves with 4–9-pairs of leaflets. Petals 7–11 mm long, very rarely up to 13 mm. Lateral leaflets oblong-ovate or oblong-elliptic . . . . 18. **C. uliginosa** M. B.
+ Leaves with 1–3 pairs of leaflets or simple. Petals 8–15 mm long . . . . 26.
26. Plant glabrous or leaves shortly and sparsely hairy. Terminal leaflet of cauline leaves large, ovate, cuneate. Petals usually white, sometimes lilac, 10–15 mm long . . . . 13. **C. tenera** Gmel. jun.
+ Plant often densely pubescent, usually with very large terminal leaflets (ca. 4 cm long and almost as broad). Lower cauline leaves 2–3-paired, the upper simple or 1-paired . . . . 16. **C. seidlitziana** Alb.

Note. Many species of the genus Cardamine possess antiscorbutic properties. Among them are C. amara, C. pratensis, C. dentata, C. hirsuta, C. impatiens, C. pectinata, C. parviflora, and C. uliginosa. In spite of their burning taste, they are eaten by domestic animals, except for horses.

Section 1. MACROPHYLLUM Schulz, Monogr.(1903) 326, 396.— Rootstock tuberous or elongate, producing shoots, not squamose. Raceme 6—25-flowered. Funicle somewhat dilated. Embryo pleurorhizal. Cotyledons flat with petioles equal to or shorter than the thin radicle. Tall plants, with large leaves.

1. C. macrophylla Willd., Sp. pl. III (1800) 484; Ldb., Fl. Ross. I, 128; O. E. Schulz, Monogr. (1903) 399; Kom., Fl. Manchzh. II, 363; N. Busch, Fl. Sib. et Or. Extr. II (1915) 236; Kryl., Fl. Zap. Sib. VI, 1309. — Ic.: N. Busch, l. c., 237 et tab. geogr. 239. — Exs.: HFR No. 504.—

Perennial; rootstock oblong, producing shoots ca. 4 cm long, 2 mm thick; stem 30—100 cm high, ascending from decumbent base, simple or branching above; leaves with 2—4 pairs of lateral leaflets; terminal leaflet of radical leaves and lower cauline crenate-dentate, 3—6 cm long, 1.5—4 cm broad, lateral somewhat smaller; all leaflets elliptic, lanceolate-ovate or obovate, obtuse (var. obtusifolia Kryl.) or acuminate, crenate, dentate or serrate. Raceme short, with about 25 flowers; flowering pedicels ca. 8 mm long, in fruit 10—15 mm long, divergent; sepals ca. 4 mm long, broadly oblong; petals 157 pale lilac or pink, rarely white, 7—12 mm long, broadly oboval; siliques suberect, 25—40 mm long, 1.5—2 mm broad, sparsely appressed-hairy (var. eriocarpa N. Busch) or glabrous (var. strigosa Schulz); style thick, 1—2.5 mm long; seeds 1.5—2 mm long, 1—1.2 mm broad, ca. 0.5 mm thick, oblong, grayish brown. June—August.

Streams and rivers, shady forests and groves, damp places, and sometimes in the subalpine zone and tundra.— Arctic: Arc. Sib.; European part: Dv.-Pech., V.-Kama.; W. Siberia: Ob, Irt., Alt.; E. Siberia: Yenis., Ang.-Say., Lena-Kol. (few), Dau.; Far East: Ze.-Bu., Uda., Uss. **Gen. distr.**: Mong. Described from Siberia (Mangazeya, at the mouth of the Taz River). Type in Berlin.

Note. C. macrophylla and the following C. leucantha represent geographic races of common origin. An Early Tertiary species diverged into these two races.

2. C. leucantha (Tausch) Schulz, Monogr. (1903) 403; N. Busch, Fl. Sib. et Or. Extr. 2 (1915) 239. — Dentaria leucantha Tausch in Flora 19, 2 (1836) 404. — D. dasyloba Turcz. in Bull. Soc. Nat. Mosc. 27, 2 (1854) 296; Turcz. App. ad Fl. baic.-dah. in Bull. Soc. Nat. Mosc. (1857), No. 103. — Cardamine dasyloba Kom., Fl. Manchzh. II (1903) 363. — Ic.: N. Busch, l. c., 240 et tab. geogr. 242.

Perennial; rootstock producing shoots to 20 cm long, thin, ca. 0.75 mm thick; stem 30—70 cm high, usually branching above, flexuous, stem and leaves densely covered with short hairs; leaves hairy, with 2—3 pairs of lateral leaflets, leaflets acutely serrate. Sepals ca. 3.25 mm long, narrowly oblong, pale green; petals white, narrowly oblong-cuneate, 5—8.5 mm long;

siliques declinate on divergent pedicels, 18–25 mm long, ca. 1.2 mm broad, sparsely hairy; style filiform, 3–5 mm long; seeds nearly 2 mm long, 1 mm broad, 0.5 mm thick, chestnut-grayish brown. May–July.

Shady, damp forests and clearings by streams, riverbanks, and especially in willow groves. – E. Siberia: Dau.; Far East: Ze.-Bu., Uss., Uda., Sakh. Gen. distr.: Jap.-Ch. Described from Dauria, near the Shilka River. Type in Leningrad.

3. **C. yezoensis** Maxim. in Bull. Acad. Sc. St.-Pétersb. VIII (1873) 277; Kom., Fl. Manchzh. II (1903) 365.

Perennial, glabrous, tall plant with long creeping multicipital rhizome; stem rather stout, erect or ascending, 25–70 cm high; leaves all petiolate, pinnatipartite, usually with 5 segments of which the apical is the largest, radical leaves long-petioled, rounded, obtusely dentate or lobulate, cauline leaves cuneate-obovate, the foremost incised or somewhat coarsely 158 serrate, the lateral segments of radical leaves orbicular-cuneate, subsessile, (cauline leaves cuneate-obovate, rhombic, oblong or broadly lanceolate, the foremost somewhat incised or subtrilobate with acute lobes), Inflorescence branched, racemes subcorymbiform subanthesis, later elongated; sepals oblong, ca. 4 mm long; petals white, ovate-rounded, 7–8 mm long, ca. 6 mm broad, fruiting pedicels 13–24 mm long; siliques flattened, 18–22 mm long, ca. 2 mm broad; style thin, 2.5–3.5 mm long, stigma minute, subcapitate. May–June.

Forests near streams. – Far East: Uss. (Iodzikhe, Wai-Fudin, and others), Sakh. **Gen. distr.:** Jap. Described from forests near Moknidza in the southern part of Hokkaido, Japan. Type in Leningrad.

Note. Easily distinguished from C. leucantha (Tausch) Schulz by its glabrescence and the completely different shape of the petals: in C. leucantha the petals are narrowly oblong, and in C. yezoensis they are ovate-rounded.

Section 2. **EUCARDAMINE** Schulz Monogr. (1903) 327, 418. – Annual, biennial, or perennial, rhizome not squamose. Raceme usually many-flowered. Ovary with 8–40, usually 24 ovules. Embryo pleurorhizal. Cotyledons flat, usually without petioles, rarely with petioles as long as radicle.

4. **C. pectinata** Pall. in DC., Syst. II (1821) 264; Prodr. I (1824) 152; Boiss., Fl. Or. I, 160; Suppl. 31; N. Busch in Fl. cauc. crit. III, 4, p. 338. – C. impatiens var. pectinata Schulz, Monogr. (1903) 458. – Exs.: Fl. Cauc. exs., No. 63.

Biennial, delicate plant; cauline leaves pinnate with 2–4 pairs of leaflets, auricled at base; leaflets petioluled, nearly always short-hairy along margin, leaflets of lower leaves ovate, obtusely 3–5-lobed, terminal leaflet 12–37 mm long, 7–22 mm broad, leaflets of upper leaves oblong-lanceolate. Flowers medium in size; sepals 2 mm long; petals white, 4–5.5 mm long; fruiting racemes almost one-sided, pedicels and siliques subhorizontally divergent, siliques 20–25 mm long, 0.75 mm broad, glabrous or hairy (v. trichocarpa N. Busch), tapering into style 3–4 mm long. March–May. (Plate VIII, Figure 5).

Shade of forests, near forest streams, and subalpine zones from 0 to 2,400 m. — Caucasus: W. and E. Transc., Tal. Gen. distr.: As. Min., Iran. Described from Iran. Type in Leningrad.

Note. Early Tertiary species.

5. **C. impatiens** L., Sp. pl. (1753) 655; Ldb., Fl. Ross. I, 128; Shmal'g., Fl. I, 48; Kom., Fl. Manchzh. II, 368; N. Busch in Fl. cauc. crit. III, 4, 335; N. Busch, Fl. Sib. et Or. Extr. II, 242; Kryl., Fl. Zap. Sib. VI, 1308. — Ic.: N. Busch, Fl. Sib. 244 et tab. geogr. 245. — Exs.: A. Bunge, Fl. exs. Est-Liv-und Kurland, No. 60; A. Kerner, Fl. exs. Austro-Hung., No. 3275.

159 Biennial, very rarely annual. Stem glabrous 15—80, generally ca. 25 cm high, leaves glabrous or sparsely ciliate; leaves rosetted, 2—4-paired; lower cauline leaves 6—9-paired, petioled, short-auricled, with leaflets petiolulate, ovate, and 3—5-toothed; upper leaves with sessile lanceolate leaflets. Flowers minute, often apetalous; sepals 1.5 mm long; petals white, 2.5 mm long, oblong-cuneate; siliques suberect on divergent pedicels, 18—30, mostly ca. 22 mm long, 1—1.1 mm broad, glabrous or sparsely pilose (var. dasycarpa (MB.) Schulz), thin, tapering into a short style (0.5—0.75 mm, very rarely up to 1 mm long); seeds 1.3 mm long, nearly 1 mm broad, 0.25 mm thick, oblong-elliptic, with a very narrow wing mainly at base, rufous. May—July.

Shady and damp forests and banks of streams and rivers. European part: Lad.-Ilm., U. V., V.-Kama, U. Dnp., V.-Don, M. Dnp., L. Don, Transv., L. V., Crim.; Caucasus: Transc., W., E., and S. Transc., Dag., Tal.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenis., Ang.-Say.; Far East: Okh., Uda., Sakh., Uss.; Centr. Asia: Kara K., Syr D., Dzu.-Tarb., T. Sh. Gen. distr.: Atl. Eur., Scand., Centr. Eur., Med., Bal.-As. Min., Iran., Ind.-Him., Tib. Described from Europe. Type in London.

6. **C. hirsuta** L., Sp. pl. (1753) 655; Ldb., Fl. Ross. I, 127; Shmal'g., Fl. II, 49; N. Busch in Fl. cauc. crit. III, 4, 341. — Ic.: Scop., Fl. Carn. ed. II (1762) tab. 38; Rchb., Ic. Fl. Germ. II, tab. 26, f. 4304. — Exs.: HFR No. 1361; A. Kerner, Fl. exs. Austro-Hung., No. 596.

Annual; stem glabrous, 10—20, rarely 30 cm high; leaves rosetted, lower cauline leaves pinnate with 1—3-pairs, sparsely pilose at apex and along margin, with a few long white cilia at base of petiole, leaflets of radical leaves petioluled, suborbicular-ovate, the apical larger than the lateral, leaflets of upper leaves oblong-linear. Flowers minute, shorter than young siliques; sepals 1.5 mm long; petals white, narrowly oboval-cuneate, 2.5—3 mm long; stamens usually 4; pedicels and siliques ascending; siliques 17—25 mm long, 0.75 mm broad, tapering into an obtuse style 1.3—1.5 mm long. March—May, in the southern part of the USSR already in February.

Among shrubs, in forests, by streams, up to 600 m. — European part: U. Dnp., M. Dnp., Crim., L. Don, Crim.; Caucasus: Transc., Dag., W. and E. Transc., Tal. Gen. distr.: Europe, Asia Minor, Syria, Iran., Him., N. Africa, Cameroun, Abyssinia, Kilimanjaro, Jamaica. Described from Europe. Type in London.

7. **C. flexuosa** With., Bot. Arr. Brit. Pl. ed. III, t. 3 (1796) 578. — C. sylvatica Link in Hoffm., Phyt. Blaett. I (1803) 50; Ldb., Fl. Ross. I, 127. — C. umbrosa Andrz. in DC., Syst. II (1824) 260; Ldb., l. c., 127.

160 Annual, much resembling C. hirsuta L.; stem usually single; leaflets of upper leaves similar to lower. Stamens usually 6; siliques on spreading pedicels, erect. Fl. in spring.

Damp shady places. — European part: U. Dnp., M. Dnp. **Gen. distr.:** Aland Islands, Poland. Introduced into N. China, Japan, and N. America. Described from Europe. Type in London.

8. **C. umbellata** Greene in Pittonia III (1897) 154; N. Busch, Fl. Sib. et Or. Extr. II, 244; Kom., Fl. Kam. II, 176. — Ic.: N. Busch, l. c., 246 et tab. geogr. 247.

Perennial; rootstock very stout, short; stem 4.5—40, usually ca. 30 cm high, very stout, glabrous, simple or branching; leaves with 1—4 pairs of leaflets, rosetted, often withering toward flowering, terminal leaflet reniform, obscurely 3—5-serrate, terminal leaflet of cauline leaves often deeply and acutely 3-lobed; all leaves sparsely pilose at tip and along margin, always with few somewhat long white cilia at base of petiole. Racemes umbellate; pedicels at flowering 1.5—2 mm long, in fruit 5—8 mm long; sepals sometimes purple; petals white, narrowly oboval-cuneate, obtuse at apex, ca. 4.5 mm long; stamens always 6; siliques 18—35 mm long, erect; style 0.5—1.5 mm long; seeds 1 mm long, 0.75 mm broad, 0.2 mm thick, parallelepiped-ovoid, dark brown, very narrowly winged. June—July.

Shady banks of streams and rivers, forests, and subalpine zones. — Far East: Kamch. **Gen. distr.:** Ber., N. Am. Described from North America.

Note. Species similar to C. hirsuta L., but differs in that 1) it is a perennial, 2) leaves and flowers are larger, 3) always stamens, 4) siliques longer, and 5) flowers crowded in a short subcorymbiform raceme. A typical character of C. hirsuta L.— the presence of a few long white cilia at base of petiole — is also true of C. umbellata. C. umbellata is an ancient species, C. hirsuta more recent. The Kamchatka forms of C. umbellata have been described by V. L. Komarov.

9. **C. regeliana** Miq., Fl. Japon. II (1865—1866) 73; N. Busch, Fl. Sib. et Or. Extr. 2 (1915) 247; Kom., Fl. Kamch. II, 177. — C. angulata var. kamtschatica Rgl. in Bull. Soc. Nat. Mosc. XXXIV, 2 (1861) 172. — C. hirsuta var. regeliana Maxim. in Mél. Acad. Pétersb. 9 (1873) 2, No.112. — C. flexuosa var. regeliana Kom., Fl. Manchzh. II (1903) 369. — Ic.: N. Busch, l. c., 248 et tab. geogr. 249.

Annual or biennial, stem simple or branching, somewhat flexuous, more or less pilose; leaves rosetted, lower cauline 4—6 pairs with large
161 crenate-lobate distinctly petiolulate leaflets, the upper cauline generally 1-paired, all sparsely hairy on both sides and along margin; terminal leaflet in all leaves much larger than the others, irregularly large-toothed. Raceme usually many-flowered (ca. 20 flowers); pedicels at flowering 3—4 mm long, in fruit 7—10 mm long; sepals purple or blackish at apex; petals 3.5—4, rarely 6 mm long; ovary 28—44-ovuled; siliques on divergent pedicels, 20—25 mm long; style 0.75—1 mm long; seeds 0.8—1 mm long, 0.6—0.75 mm broad. June—July.

Damp places and along banks of streams and rivers. — Far East: Uss., Kamch., Okh., Sakh. **Gen. distr.:** Ber., Jap.-Ch. Described from Japan. Type in Paris.

Note. Species resembling C. flexuosa With.; distinguished from the European C. flexuosa by: 1) a less flexuous stem, 2) larger flowers, 3) broader petals, and 4) longer siliques.

10. **C. parviflora** L., Syst. Nat. ed. 10 (1758–1759) 1131; Ldb., Fl. Ross. I, 128; Shmal'g., Fl. I, 49; Kom., Fl. Manchzh. II, 370; N. Busch, Fl. cauc. crit. III, 4 (1909) 344; N. Busch, Fl. Sib. et Or. Extr. 2 (1915) 249; Kryl., Fl. Zap. Sib. VI, 1309. – Ic.: N. Busch, Fl. Sib. et Or. Extr. VI (1931) 250 et tab. geogr; 251. – Exs.: HFR No. 155; Rchb., Fl. Germ. exs., No. 1071; A. Kerner, Fl. exs. Austro-Hung., No. 2894. –

Annual, glabrous; stem 10–50 cm, usually ca. 20 cm high, generally erect; leaves pinnate, multijugate, with sessile leaflets; the apical leaflets almost equal to the lateral; leaflets of lower leaves oblong, rounded at apex, cuneate, sometimes obovate or obovate-trilobulate (var. manshurica Kom.), leaflets of upper leaves linear-subulate. Flowers minute; sepals 1.5 mm long, narrowly ovate; petals white, oblong-cuneate, 2–2.5 mm long; fruiting pedicels subhorizontal; siliques erect, very thin, 10–20 mm long, 0.75 mm broad, with or without style to 0.75 mm long; seeds yellowish-grayish brown, short-ovate, very narrowly winged, minute, 0.75 mm long, 0.5 mm broad, 0.25 mm thick. May–July.

Silty places and along banks of streams and rivers. – European part: U. Dnp., M. Dnp., V.-Kama, Transv., V.-Don, U. V., L. Don, Bl., Crim.; Caucasus: Cisc., Tal.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenis., Ang.-Say., Dau.; Far East: Ze.-Bu.; Centr. Asia: Balkh. Gen. distr.: Scand., Centr. Eur., Bal., Atl. Eur. (France), Med., Iran., Jap.-Ch., Mong., Tib. Described from Europe. Type in London.

11. **C. lazica** Boiss. et Bal. in Boiss., Fl. Or. Suppl. (1888) 31; N. Busch in Fl. cauc. crit. III, 4 (1909) 344. – C. amara prol. lazica Schulz, Monogr. (1903) 500.

Perennial, glabrous plant; rhizome creeping, developing with shoots; stems ascending, 20–40 cm high, sulcate, profusely leafy; leaves delicate, 162 nearly all equal in shape, pinnate with 2–3 pairs of leaflets, segments subsessile, ovate, the terminal much larger, emarginate or lobed. Sepals 2.5–3 mm long; petals white, 5–6.5 mm long; anthers yellow; pedicels and siliques ascending; siliques 20–22 mm long, very narrow, 1–1.5 mm broad, tuberculate, tapering into a style 2–3 mm long; seeds rufous, short-ovate, small, 1 mm long, 0.75 mm broad, 0.25 mm thick. April–May.

Near streams and moist rocks, 0–1,000 m. – Caucasus: W. Transc. Gen. distr.: As.-Min. (shores of the Black Sea in Rize). Described from Rize and the subalpine zones between the villages of Andon and Dzhimil, 940 m. Type in Geneva.

Note. Tertiary relict, related to C. amara L.

12. **C. lyrata** Bge. in Mém. Ac. sav. étr. II (1835) 573; Ldb., Fl. Ross. I, 125; Kom., Fl. Manchzh. II, 368; N. Busch, Fl. Sib. et Or. Extr. II, 254. – Ic.: N. Busch, l. c., et tab. geogr. 255.

Perennial with creeping rhizome and long stolons above ground; stem mostly 20–40, rarely up to 80 cm high, erect from an ascending base, generally simple or sometimes long-branching above, subglabrous; leaves of stolons rather long petioled, simple (rarely with 1 pair), cordate-reniform; cauline leaves sessile, the lower with 1–3 pairs, the upper with 2–1 pairs of leaflets or simple; terminal leaflet in all leaves much larger than the lateral. Raceme loose, 10–30-flowered; pedicels at flowering 5–10 mm long, in fruit 12–14 mm long; sepals 2.5–3 mm long, ovate; petals white, oboval-cuneate, truncate at apex, obscurely retuse, 5–8 mm long; siliques ascending on subhorizontal pedicels, 20–30 mm long, 1.2 mm broad, valves flat, glabrous, with inconspicuous nerves; style 1.5–2 mm long; seeds flat, flattened, angular, 2 mm long, 1 mm broad, with thin interrupted wing, grayish brown. June.

Banks of rivers and streams. – E. Siberia: Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.**: Mong., Jap.-Ch. Described from Dauria. Type in Leningrad.

Note. Early Tertiary Far Eastern species.

13. **C. tenera** Gmel. jun. ex C. A. M., Verz. Pfl. Cauc. (1831) 179; Ldb., Fl. Ross. I, 124; Boiss., Fl. Or. I, 163; N. Busch in Fl. cauc. crit. III, 4, 345.

Perennial; rhizome short, thin, densely fibrose, producing many stolons; stem ascending, 25–40 cm long, sulcate; leaves pinnate with 1–3 pairs, rarely with 4 pairs of leaflets; leaflets subsessile, subentire, often minute and scantily pilose (under magnifying lens), leaflets of lower leaves ovate-
163 orbicular, the terminal very large, leaflets of upper leaves oblong. Raceme at flowering loose; sepals 3–3.5 mm long, narrowly ovate; petals white or rarely lilac, broadly oboval, cuneately tapering into a rather long claw, 10–15 mm long; fruiting pedicels ascending or subhorizontal; siliques ascending, mostly 30–40 mm long, 1.25–1.3 mm broad, slightly tapering into a style 0.5–1 mm long, thick. March–April.

Damp shady forests and low-mountain zones.—European part: Crim.; Caucasus: W. and E. Transc., Tal. **Gen. distr.**: Iran. Described from forests near Lenkoran. Type in Leningrad.

Note. Tertiary relict with flowers large and leaflets of upper leaves oblong, thus differing slightly from C. lazica and C. seidlitziana.

14. **C. amara** L., Sp. pl. (1753) 656; Ldb., Fl. Ross. I, 124; Shmal'g., Fl. I, 50; N. Busch, Fl. Sib. et Or. Extr. 2, 252; Kryl., Fl. Zap. Sib. VI, 1306. – Ic.: N. Busch, l. c., 252 et tab. geogr. 253.

Perennial; rhizome creeping, stoloniferous; stem glabrous or pilose (together with leaves) (var. hirta Wimm. et Grab.) or pilose only at base (var. subglabra Schulz), 20–40, rarely up to 60 cm high; leaves with 4–7 pairs of leaflets; lateral leaflets sessile, obovate or oblong, obscurely angular-dentate to entire; terminal leaflet petioluled, larger and broader than lateral, leaflets of radical leaves subreniform. Raceme at flowering corymbiform, later elongating, rather loose, 6–30, usually 15-flowered; sepals 3.5–4 mm long, ovate; petals white, oboval, 6–9 mm long; stamens nearly as long as petals; anthers violet; siliques erect on ascending pedicels, 20–40 mm long, 1–2 mm broad; style 1–3 mm long, thin, subulate; seeds small, 1 mm long, 0.75 mm broad, 0.25 mm thick, short-ovate, rufous. May–June.

Along banks of streams. – European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. V., V.-Kama, U. Dnp., V.-Don, M. Dnp., Bl., L. Don, Transv.; W. Siberia: Ob, U. Tob., Alt. **Gen. distr.**: Scand., Atl. and Centr. Eur., W. Med., As. Min. Described from Europe. Type in London.

Note. Palearctic species.

Economic importance. Leaves used for salads.

15. **C. prorepens** Fisch. in DC., Syst. II (1821) 256; Kom., Fl. Manchzh. II, 366; N. Busch, Fl. Sib. et Or. Extr. II, 255. — Ic.: N. Busch, l. c., 157 et tab. geogr. 258.

Perennial with creeping rhizome; stem 15—25, rarely up to 45 cm long, ascending from a decumbent base, simple or somewhat branching, glabrous, short-pilose only at base; rootstock-leaves and lower cauline with 3—4 164 pairs, the upper sometimes with 2 pairs of leaflets, all and especially the upper leaves white-pilose toward apex and along margin; terminal leaflets slightly larger than the lateral. Raceme loose, 9—16-flowered; pedicels at flowering 10—25, in fruit 25—32 mm long; sepals 4 mm long, ovate; petals white, 8—14 mm long, broadly oblong-ovate, slightly emarginate at tip, tapering abruptly at base into a claw; siliques pilose (f. hebecarpa N. Busch), rarely glabrous (f. psilocarpa Schulz), 15—25 mm long, 1.25—2 mm broad; style 2.2.5 mm long. May—July.

Along banks of streams and riverbeds. — E. Siberia: Lena-Kol., Ang.-Say., Dau.; Far East: Ze.-Bu., Uda., Uss. Gen. distr.: Manchuria, N. Korea. Described from Doroninsk on the Ingoda River (Dauria). Type in Leningrad.

Note. Tertiary relict, remained mainly in the Far East.

16. **C. seidlitziana** Alb., in Bull. Herb., Boiss. II (1894) 20; N. Busch in Fl. cauc. crit., III, 4 (1909) 346. — C. raphanifolia prol. seidlitziana Schulz, Monogr. (1903) 513.

Perennial, glabrous or stem and leaves soft-pilose (var. pilosa Schulz); rootstock creeping, bearing shoots; stems simple, ascending to erect, 20—60 cm long, rigid, markedly sulcate; lower cauline leaves pinnate with 2—3 pairs of leaflets, the terminal large, rounded, obtuse or lightly cordate, sinuate or indistinctly crenate along margin, lateral leaflets ovate, always sessile; upper cauline leaves often simple or barely 1-paired, with an ovate, more or less long-petiolate terminal leaflet. Racemes at flowering corymbiform, later elongating, loose; sepals broadly ovate, 3.5—4 mm long; petals broadly oboval, gradually tapering into a lilac-colored claw, ca. 8 mm long; fruiting pedicels 14—25 mm long, ascending; siliques erect, 25—35 mm long, 1.5 mm broad, tapering into a style 1—2 mm long, valves straw-colored or violet; seeds rufous, short-ovate, 2 mm long, 1.5 mm broad, 0.5 mm thick. June—July.

By streams of the alpine and subalpine zone, 1,800—3,000 m, rarely at lower altitudes down to 1,300 m. — Caucasus: western part of the N. Caucasus, W. Transc. Endemic. Described from Megreliya (Lekudeli, Chkhorokhtsu, and Urulab). Type in Leningrad.

Note. Early Tertiary relict, which remained in the western Caucasus; the related C. raphanifolia Pourret remained in the Pyrenees. It is probable that both species were derived from a common ancestor widely distributed in the Mediterranean area and the Caucasus in the Tertiary. It is also likely that C. uliginosa M. B., which is widely distributed in the Caucasus and in adjacent parts of Turkey and Iran, was derived from the ancestor of C. seidlitziana.

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17. **C. sachokiana** N. Busch, in Addenda VII, p. 477.

Perennial, almost wholly glabrous, with inconspicuous short bristles only along margin of leaves; stem low, 6—10 cm high at flowering, almost all leaves radical, cauline only 1 or 2; radical leaves rosetted, long-petiolate, simple, obovate or orbicular-rhombic, entire or with 1 or 2 obtuse teeth on each side, cauline leaves sessile, oblong, obtuse. Raceme at flowering short; sepals ovate, with narrow white membranous rim 2—2.5 mm long along margin; petals lilac or white or only white at base, 4.5 mm long, obovate; ovary unilocular, stigma capitate. August.

Limestone taluses.— Caucasus: W. Transc. Endemic. Described from Abkhazia, from the Arabik Mountain, as recorded from Sakhokiyas specimen. Fl. 30 August. Type in Leningrad.

Note. Another unique endemic species from the limestones of Abkhazia, it is distinguished from all other Caucasian species by its entire leaves. It is related only to C. seidlitziana Alb.; there is no morphological resemblance. This conclusion is supported by the smallness (relatively) of the flowers, their almost exclusively lilac color, and the shape of the radical leaves somewhat reminiscent of the shape of the terminal leaflet of the radical leaves of C. seidlitziana Alb.

18. **C. uliginosa** M. B., Fl. taur.-cauc. III (1819) 438; Boiss., Fl. Or. I, 162; Suppl. 31; Schulz, Monogr. (1903) 514; N. Busch in Fl. cauc. crit. III, 4, 348.

Perennial with creeping stoloniferous rhizome; stem glabrous or more or less short-scabrous (var. pilosa Schulz), ascending at base, nearly erect, simple, or somewhat branching at top, sulcate; leaves pinnate with 4—9 pairs, the uppermost often with 2 pairs of leaflets; leaflets entire or angular, all subequal or terminal larger, lower leaves short-petiolate, ovate to suborbicular, upper leaves oblong. Racemes dense at flowering, then elongated; sepals 4—4.5 mm long; petals straw-yellow-colored, white, or lilac, 7—11 mm, mostly 8 mm long; rarely sepals up to 5 mm long, petals 12—14 mm long, (var. grandiflora N. Busch); anthers yellow; fruiting pedicels ascending; siliques more or less erect, 25—35 mm long, 1.5 mm broad, glabrous, tapering into a stout style 1—1.5 mm long; seeds dark rufous, globular, 1.5 mm long and broad, 0.6 mm thick. April—July.

Near forest and high-mountain streams, 1,600—3,000 m, rarely at lower altitudes down to 800 m. — Caucasus: entire Caucasus and Transcaucasia. **Gen. distr.:** Arm.-Kurd., Iran. Described from the northern Caucasus (Tatartup). Type in Leningrad.

Note. Varies in pubescence, in size and breadth of leaves and leaflets, size of flowers, and stature. A younger derivate from C. seidlitziana type.

166 **Economic importance.** The leaves are used as a food seasoning and possess antiscorbutic properties. A nectar plant.

19. **C. pratensis** L., Sp. pl. (1753) 656; Ldb., Fl. Ross. I, 126; Shmal'g., Fl. I, 49; Schulz, Monogr. 523; Kom., Fl. Manchzh. II, 366; Fl. Kamch. II, 174; N. Busch, Fl. Sib. et Or. Extr. II, 258; Kryl., Fl. Zap. Sib. VI, 1306. — Ic.: N. Busch, l. c., 261 et tab. geogr. 264. — Exs.: HFR No. 1452.

Perennial; stem mostly 20—30 cm high, erect, simple or branching, glabrous; leaves with 4—10 pairs of leaflets, the radical long-petiolate, glabrous, rarely sparsely appressed-hairy, leaflets petiolulate, orbicular or reniform, entire, the terminal one larger than the lateral; cauline leaves short-petiolate, without auricles, glabrous, with leaflets sessile, narrow, linear-oblong to linear, uppermost leaves with 2—3 pairs, lateral leaflets entire, 1-nerved, the terminal just slightly larger than the lateral. Raceme subcorymbiform subanthesis, later elongated, loose, 10—20-flowered;

edicels at flowering 10—20 mm long, in fruit somewhat longer; sepals ovate, a. 3 mm long; petals mostly lilac, ca. 10—12 mm long; siliques suberect on ascending pedicels, 28—40 cm long; style thin, not thickened under stigma; seeds oblong-ovate, dark yellow or grayish-brownish, up to 1.5 mm long, nearly 1 mm broad. May—August.

Damp meadows, rarely along banks of rivers and streams. — European part: all parts except for L. V., L. Don, and Crim.; Siberia- all regions; Far East: Okh., Kamch., Ze.-Bu., Uda. **Gen. distr.:** All Europe, Mong., W. Tib., Abyssinia, N. Am., Greenland. Described from Europe. Type in London.

Note. A Palearctic species.

Economic importance. Leaves sometimes used as a food seasoning and possess antiscorbutic properties. A nectar plant.

20. **C. dentata** Schultes, Obs. Bot. (1809) 126; Lindman in Bot. Notiser H. 6 (1914) 267 cum iconibus; Kom., Fl. Kamch. II, 175. — C. pratensis var. dentata Neilr., Fl. Nied. Oesterr. II (1859) 718; Shmal'g., Fl. I, 49; N. Busch, Fl. Sib. et Or. Extr. II, 260; Kryl., Fl. Zap. Sib. VI, 1307.

Perennial, resembling C. pratensis L.; leaves of a darker hue; leaflets of cauline leaves broader, shortly petiolulate, leaflets of radical leaves suborbicular, slightly emarginate-dentate, petiolulate, the uppermost larger than the others, easily falling then rooting (vegetative reproduction). Flowers larger; petals ca. 15 mm long, white, rarely lilac, nerves colorless or violet, barely visible; style of ripe silique stout, thick under stigma when dry. May—August.

Lake banks, ditches, spring puddles, and shady damp places. — In the distribution area of C. pratensis L. Described from Europe. Type in
167 Krakow, cotype in Stockholm.

Note. A forgotten species till republished in the comprehensive work of Lindman, amply illustrated. A. P. Il'inskii (Izv. Bot. Sada, 25, 4, 1926) attributes the importance of the vegetative reproduction of this species to its falling leaflets which develop into new plants; he notes the difference in the number of somatic chromosomes in C. pratensis L. and C. dentata Schulz. (In the first species there are 24 chromosomes, in the second 72). He received this information from Senyaninova-Korchagina. D. dentata is an intermediate between C. pratensis and the narrowly lobed forms of C. amara L. It may be a natural hybrid of these species.

Section 3. CARDAMINELLA Prantl in Engl. u. Prantl, Nat. Pflzfam. III, 2 (1891) 184 part.; Schulz, Monogr. (1903) 327, 550. — Perennials with rootstock. Stem low, usually simple. Leaves minute, more or less simple, rarely pinnate. Raceme few- (3—18) flowered. Ovary with 12—24, very rarely with 32 ovules. Septum not pitted. Embryo notorrhizal. Cotyledons flat, without petioles.

21. **C. hyperborea** Schulz, Monogr. Cardamine (1903) 550; N. Busch, Fl. Sib. et Or. Extr. II, 265. — C. digitata Richards. in Frankl. Journ. App. VII (1823) 743 (26), non Lam. 1786. — C. oxyphylla Andrz. ap. Ldb., Fl. Ross. I (1842) 128, nom. nudum. — Ic.: N. Busch, l. c., 265 et tab. geogr. 266.

Perennial; stem 6–20 cm long, ascending, simple or branching at top, glabrous; leaves pinnate, radical with 1 or 2 pairs of leaflets, cauline with 2 or 3 pairs. Raceme 10–18-flowered; sepals 3.5 mm long, narrowly ovate; petals 5–10 mm long, white or red, oboval, rounded at summit, cuneately tapering at base; siliques suberect on ascending pedicels, 25–30 mm long, 1.5 mm broad; style 1 mm long; seeds small, 1 mm long, 0.75 mm thick, oblong, wingless, dark brown. June–August.

Damp places and by streams. — Arctic: An., Chuk. **Gen. distr.:** Alaska. Described from Alaska. Type in North America.

Note. A species of a specific distribution area which might be called the Bering type.

22. **C. victoris*** N. Busch, Fl. Sib. et Or. Extr. VI (1931) 706. — Ic.: N. Busch, l. c., 707.

Perennial, slender, completely glabrous plant; rootstock whitish, slender; stem (above ground) 8–15 cm high, ascending, simple; leaves narrowly linear, simple. Raceme 3–6-flowered; sepals oblong-ovate, with narrow white rim, 168 2–2.5 mm long, 1–1.5 mm broad; petals 5–6.5 mm long, 2–2.5 mm broad, white, clawed, blade oboval-oblong; longer stamens 2.5–3 mm long, the shorter 2 mm long; median nectariferous glands large, spatulate, entire, embracing the base of the shorter stamens; pedicels ascending, 6–13 mm long; siliques flat, tapering into a style up to 3 mm long. July. (Plate III, Figure 4).

Damp places of river valleys. — Arctic: An. Endemic. Described from Penzhina Bay, from the upper reaches of the Oklan River in depressions of water among willows (Salix purpurea) in river valleys, and from the Anadyr River above the village of Markovo. Type in Leningrad.

Note. Species closely allied to C. hyperborea.

23. **C. minuta** Willd. apud DC., Syst. II (1821) 251; Schulz, Monogr. Cardamine (1903) 551; N. Busch, Fl. Sib. et Or. Extr. II (1909) 266; Kom., Fl. Kam. II, 175. — C. microphylla Adams in Mém. Soc. Nat. Mosc. 5 (1817), III, non Willdenow sub Dentaria; Ldb., Fl. Ross. I, 124. — Ic.: N. Busch, l. c., 267 et tab. geogr. 268.

Perennial, glabrous plant; stem 4–8, rarely up to 15 cm long, ascending, simple or branching above; leaves small, the radical with 1 or 2, rarely with 3–5 pairs of leaflets, cauline leaves ternate or entire. Raceme rather loose, 5–8-flowered; sepals 2–3 mm long; petals white or pale lilac, 5–9 mm long; siliques suberect on ascending pedicels. July–August.

Arctic and alpine mountain zone. — Arctic: Arc. Sib.; Far East: Kamch. **Gen. distr.:** N. Am. (N. Alaska). Described from Cape Bykov. Type in Berlin.

24. **C. bellidifolia** L., Sp. pl. (1753) 654; Ldb., Fl. Ross. I, 123; N. Busch, Fl. Sib. II, 268; Kryl., Fl. Zap. Sib. VI, 1305; Kom., Fl. Kamch. II, 173. — C. lenensis Andrz. in Ldb., Fl. Alt. III (1831) 33; Fl. Ross. I, 123. — Ic.: N. Busch, l. c., 271 et tab. geogr. 272.

Perennial, glabrous; stem 1–6, mostly 3.5 cm high, simple, rarely few-branched above; leaves mostly radical (except 1 or 2), long-petiolate, simple, elliptic, ovate, entire or slightly emarginate, rounded at apex. Raceme 2–5-flowered; sepals 2–2.5 mm long, oblong; petals 3.5–6 mm long

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* Named in honor of V.B. Sochava.

(f. grandiflora Schulz), white, oboval, rounded at top; siliques erect on ascending pedicels, 10—24 mm long, 1.5—1.8 mm broad; style nearly absent; seeds 1.5 mm long, 1 mm broad, 0.33 mm thick, ovate, yellowish brown. June—July.

Damp places, stony banks of rivers and streams in the Arctic and alpine mountain zones. — Arctic: Arc. Eur., Arc. Sib., Chuk., An.; W. Siberia: Alt.;
169 E. Siberia: Ang.-Say., Dau.; Far East: Kamch. **Gen. distr.**: Arc. Eur., Scand., mountains of N. Mong., N. Am.: Arc., mountains of the north. Described from the Arctic and Europe. Type in London.

Note. An Arcto-alpine species, circumpolar.

25. **C. pedata** Rgl. et Til., Fl. Ajan. (1859) 47; Schulz, Monogr. (1903) 552; N. Busch, Fl. Sib. et Or. Extr. II (1915) 267. — Ic.: N. Busch, l. c., 269 et tab. geogr. 270.

Perennial, glabrous; rootstock creeping; stem 5—12 cm long, ascending, simple; leaves pedate-lobular. Raceme at flowering corymbiform, 6—10-flowered; sepals 3 mm long, oblong-ovate; petals white, 6—8 mm long, broadly oval, tapering gradually into a claw; siliques suberect on ascending pedicels, 18—20 mm long, ca. 1 mm broad; style ca. 1 mm long; seeds yellow-brown. June.

Meadows and shady places. — Far East: Okh. (Ayan). Endemic. Described from Ayan. Type in Leningrad.

Note. Endemic in East Siberia. Found only in Ayan. Apparently, a Tertiary relict, very isolated morphologically from other species of Cardamine.

26. **C. purpurea** Cham. et Schlecht. in Linnaea I (1826) 20; N. Busch, Fl. Sib. et Or. Extr. II—III (1915—1919) 272; Kom., Fl. Kamch. II (1929) 179. — Ic.: N. Busch, l. c., 273 et tab. geogr. 270.

Perennial; rootstock tufted with numerous petioles of decayed leaves; stem 5—10 cm long, ascending to erect, simple or slightly branched, with 1—3 leaves, pilose; radical leaves entire or with 1—3 pairs, cauline leaves with 1 or 2 pairs of leaflets. Raceme 6—10-flowered; sepals ca. 2.5 mm long, short-ovate, pilose; petals 6 mm long, purple, broadly oboval, abruptly tapering at base into a linear claw; ovary glabrous, 12—13-ovuled; style 0.5—0.75 mm long.

Stony places and rocks. — Arctic: Chuk. **Gen. distr.**: St. Lawrence Island, Alaska. Described from St. Lawrence Island. Type in Leningrad.

Note. This species is related to the geographical type which may be called the Bering type.

Section 4. **PTERONEURUM** (DC.) Schulz, Monogr. (1903) 569; Pteroneurum (gen.) DC., Syst. II (1821) 269. — Styles and placentas keeled (narrowly-winged).

27. **C. graeca** L., Sp. pl. (1753) 655; Schulz, Monogr. (1903) 574; N. Busch in Fl. cauc. crit. III, 4, 355. — C. petiolaris DC., Syst. II (1821) 264. — Pteroneurum graecum DC., Syst. II (1821) 264.

Annual, glabrous or sparsely ciliate plant; stem 5—20 cm, mostly ca. 170 15 cm high, ascending; leaves pinnate, leaflets petiolulate, ovate, lobed or divided, the terminal cuneate. Raceme 8—15-flowered, rather loose; sepals 2.5—3.25 mm long, oblong; petals white, oboval, 5—7 mm, mostly 6 mm long; fruiting pedicels ascending; siliques ascending, linear-lanceolate, ancipital, narrowly winged, large, 3.5—4.5 cm, rarely 5 cm long, 3—4 mm broad, tapering into a style 4—6 mm long, 1—1.5 mm thick, ancipital, carinate at both sides, rarely style 1—3 mm long (var. brachystylis Schulz); seeds 4.5 mm long, up to 2.5 mm broad, 1 mm thick, subrectangular, oblong, dark rufous. April—May.

Shady rocks. — European part: Crim. Gen. distr.: Med., Bal.-As. Min. Described from Europe. Type in London.

Note. An East-Mediterranean species.

Genus 592. **PSEUDOVESICARIA*** (BOISS.) RUPR.**

Rupr., Fl. Cauc. (1869) 97; N. Busch in Fl. cauc. crit. III, 4 (1910) 144; Vesicariae sect. Pseudovesicaria Boiss., Fl. Or. (1867) 262.

Sepals subequal; petals white or pink, oboval-spatulate, entire, gradually tapering into a claw. Filaments free, edenticulate, somewhat dilated gradually upward. Style gradually tapering above. Stigma minute. Silicle large, tapering at base into reduced gynophore, rounded-ovate or elliptic, bilocular, valves membranous, mostly inflated, 2—4-seeded, rarely polyspermous. Funicles adnate at base to septum. Septum hyaline, nerveless. Seeds not emarginate. Embryo pleurorhizal, radicle lying obliquely. — Glabrous biennial, with rigid leaves.

A monotypic genus, the only species of which is endemic in the Greater Caucasus.

1. **P. digitata** (C. A. M.) Rupr., Fl. Cauc. (1869) 97; N. Busch in Fl. cauc. crit. III, 4 (1910) 145. — Vesicaria digitata C. A. M., Verz. (1831) 180. — Ic.: Somm. et Lev., Enum. tab. VII, fig. c. — Exs.: HFR No. 158.

Biennial, completely glabrous, glaucous, low plant; stem stoutish, nearly simple, 5—20 cm high, rapidly terminating in a capitate elongated raceme; leaves small, thickish, obovate, the lowest subentire or obtusely tridentate, cauline leaves sessile, divided at apex into 3—5 linear lobes. Fruiting 171 raceme subunilateral, dense, 4—15 cm long; fruiting pedicels thickened, 10—15 mm long; flowers congested; sepals 2.5—3.5 mm long; petals 5—7 mm long; silicles 1—2 cm long, 7—11 mm broad, style cylindrical, 1.5—4 mm long (style 0.5—1 mm long, conical in var. bursapastoris S. et L.); seeds 2.5—3 mm long, 1.5—2 mm broad. Fl. June—July.

Taluses of the alpine zone, 2,000—3,400 m. — Caucasus: Greater Caucasus. Endemic. Described from the alpine zone of Dagestan, from the taluses of Tufandag, 2,600 m. Type in Leningrad.

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* From the Greek pseudo — false, and the Latin Vesicaria — name of a genus.

** Treatment by N.A.Bush.

Genus 593. **TURRITIS** * (TOURN.) L.**

L., Sp. pl. (1753) 666; Gen. pl. ed. 5 (1754) 298 (part.).

Sepals erect, saccate at base; petals yellowish white, long-clawed. Nectariferous glands at base of shorter stamens annular, slightly emarginate inside, connate with the broad median glands. Ovary sessile; style very short; stigma capitate; fruit a linear bivalvular silique, valves flat with distinct midrib; septum thin or thickened in the middle; epidermal cells elongated along axis, with thickened walls; seeds flattened, biseriate. Cotyledons flat. Embryo pleurorhizal. Hairs branched.

Monotypic [sic] genus, distributed in Europe, the Caucasus, Siberia, and Central Asia. The only species of this genus was introduced into North America and Australia. Its origin is apparently Central Asian, but as a weed it has been dispersed far beyond the limits of its original distribution area.

1. **T. glabra** L., Sp. pl. (1753) 666; Ldb., Fl. Ross. I, 116, 748; N. Busch in Fl. cauc. crit. III, 4, 468; in Fl. Sib. et Or. Extr. IV, 423 cum tab. geogr.; Kryl., Fl. Zap. Sib. VI, 1344. — Arabis perfoliata Lam., Encycl. I (1783) 219; Kom., Fl. Manchzh. II, 375. — A. glabra Bernh., Syst. Verz. Erfurt. (1834) 195; Shmal'g., Fl. I, 55. — Ic.: Smith, Engl. Bot. tab. 777; Rchb., Ic. Fl. Germ. tab. XLIV, fig. 4346.

Annual, glaucous plant; stem erect, 35—135 cm high, usually simple, rather densely covered at lower part (together with radical and lower cauline leaves) with branched hairs, completely glabrous above (together with upper leaves); radical leaves tapering at base, lanceolate, sinuate or coarsely serrate, the rest sessile, ovate-lanceolate, cordate-sagittate at base, amplexicaul, entire, glaucous. Sepals 3.5—5 mm long, 1—1.5 mm broad; petals 5—7.5 mm long, 1—1.5 mm broad; fruiting pedicels 5—17 mm long; 172 siliques 4—8 cm long, erect, together with pedicels appressed to stem, tetragonous-flattened; style 0.5—1.5 mm; seeds wingless, grayish brown, 1 mm long, 0.6—0.8 mm broad. June—August.

Dry and weed-infested places: fallow land, dry clearings, field borders, slopes and hills, and among shrubs. — European part: all; Caucasus: all to 2,000 m; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenis., Ang.-Say., Dau.; Far East: Uda., Uss.; Centr. Asia: Dzu.-Tarb., Balkh., T. Sh., Pam.-Al., Mtn. Turkm. **Gen. distr.:** All Europe, Dzu.-Kash.; introduced into N. Am. and Australia. Described from Europe. Type in London.

Genus 594. **ARABIS** † L. ††

L., Sp. pl. (1753) 644.

Sepals erect, often saccate at base. Petals long-clawed, white, yellow, or lilac. Filaments edenticulate. Lateral nectariferous glands annular at base of shorter stamens, often open inside, rarely closed, sometimes notched or acuminate outside, median glands 2-lobed, free or united with the lateral, sometimes reduced. Ovary sessile or with a very short gynophore; style absent or very short. Stigma short-bilobate, sometimes capitate. Fruit a linear bivalvular silique; valves flat, with or without midrib, slenderly netted-veined. Septum thin, epidermal cells irregularly multangular with strongly wavy thin walls. Seeds uniseriate, flat, sometimes winged. Cotyledons flat. Embryo pleurorhizal. Hairs branched, often mixed with simple hairs, sometimes completely absent. Annual or perennial with leaves mostly simple.

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* From the Latin turris — tower.

** Treatment by N.A.Bush.

† Arabis — from Arabia.

†† Treatment by N.A.Bush.

A genus of about 100 species, widely distributed in Europe and South America, 35 of which grow in the Soviet Union.

The genus Arabis is very widely distributed. The vast distribution area of this genus encompasses the Mediterranean area, all Europe, northern, central and eastern Asia, and South America.

Arabis is an ancient genus. The most ancient sections are Alliariopsis, Turritella, and Conringioides. Less ancient are Cardaminopsis and Euarabis. The section Alliariopsis is Caucasian-Iranian, Turritella is Mediterranean-Eurasian, Conringioides is East-Mediterranean, Cardaminopsis and Euarabis are Arcto-alpine circumpolar.

There is no basis for separating the section Cardaminopsis into a special genus.

The genus includes typical forest species, mostly Tertiary relicts, and
173 also many xerophytes of rocks, dry slopes, stony places, and unturfed areas.

Very few of the species are of practical use; for example, certain plants of the section Euarabis are ornamental.

1. Raceme one-sided: all fruiting pedicels one-sided. Flowers bracteate or ebracteate . . . . 2.
+ Raceme not one-sided, ebracteate . . . . 3.
2. Raceme bracteate. Siliques 10—16 cm long . . . . 7. **A. turrita** L.
+ Raceme ebractate. Siliques 6—7 cm long . . . . . 4. **A. secunda** N. Busch.
3. Plants resembling Alliaria officinalis Andrz. with broad, rounded or broadly ovate leaves, cordate . . . . 4.
+ Plants not resembling Alliaria, leaves not as broad, oblong . . . . . . 7.
4. Pubescence fine, farinaceous. Lower leaves 15—25 mm long, long-petiolate, rounded-cordate, obtusely incised-lobular, 12—14-lobed . . . . ★2. **A. nepetaefolia** Boiss.
+ Pubescence not farinaceous. Leaves larger, differently shaped . . . . . 5.
5. Siliques very thin (1—1.25 mm broad) 4—5 cm long, deeply constricted between the seeds, with long pedicels (1.5—2 cm long). Radical leaves large, usually 4—8.5 cm long, 4—6.5 cm broad. Seeds black, wingless . . . . 1. **A. nordmanniana** Rupr.
+ Siliques much wider (2.25—2.5 mm broad). Radical leaves smaller. . . 6.
6. Siliques long (3—6.5 cm long), with short pedicels (6—10 mm long). Seeds rounded, grayish brown or black, winged . . . . 2. **A. christiani** N. Busch.
+ Siliques short (13—28 mm long) with pedicels longer than 1 cm (10.5—16 mm long). Seeds broadly elliptic, grayish brown, wingless . . . .
7. Siliques very long (6.5—12 cm long) with pedicels 5—15 mm long . . . . . 8.
+ Siliques up to 5.5 cm long . . . . 9.
8. Siliques pendulous (Siberia, Far East) . . . . 6. **P. pendula** L.
+ Siliques ascending (Caucasus) . . . . 5. **A. laxa** Sibth. et Sm.

9. Petals purple or pink, rarely white, 10–12 mm long . . . . 10.
+ Petals white, sometimes pink or lilac or straw-yellow, 3–10 mm long . . . . 14.
10. Undershrub with stout root . . . . 15. **A. fruticulosa** C. A. M.
+ Perennials or biennials . . . . 11.
174 11. Leaves pinnatifid, plant gray with branched hairs . . . . 22. **A. bucharica** (Lipsky) N. Busch.
+ Leaves entire . . . . 12.
12. Glabrous glaucous plant, only radical leaves with stellate hairs. Siliques pendulous, falcate . . . . 8. **A. turczaninovii** Ldb.
+ Tufted plants . . . . 13.
13. Gray with stellate hairs. Siliques flattened, arranged in a fan-shaped bundle . . . . 19. **A. karategina** Lipsky.
+ Hairs branched. Siliques slightly moniliform, not crowded . . . . 18. **A. kokanica** Rgl. et Schmalh.
14. Undershrub with stout roots . . . . 15.
+ Perennials, biennials, or annuals . . . . 16.
15. Petals whitish. Stigma bilobate . . . . . . 16. **A. pachyrhiza** Kar. et Kir.
+ Petals yellow. Stigma capitate. . . . . . 17. **A. erysimoides** Kar. et Kir.
16. Pedicels 8–15, even up to 20 mm . . . . 17.
+ Pedicels 3–8 mm long. Annuals, biennials, or perennials without sterile shoots (on the ground) . . . . 24.
17. Petal limb relatively narrow, erect. Annual, scabrous with branched hairs . . . . 12. **A. borealis** Andrz.
+ Petal limb broad, oval or oblong-oval, patent. Perennials, white-pubescent, with sterile shoots above the ground . . . . 18.
18. Seeds oblong, wingless. Siliques narrowly linear . . . . 35. **A. billardieri** DC.
+ Seeds rounded, with rather narrow membranous wing. Siliques flattened, broader . . . . 19.
19. Flowers yellow or straw-yellow . . . . 34. **A. flaviflora** Bge.
+ Flowers white or claws reddish . . . . 20.
20. Petal blade white, claw reddish . . . . 32. **A. ionocalyx** Boiss.
+ Petals completely white. . . . . 21.
21. Gray-tomentose plant . . . . 22.
+ Plant densely covered with very short stellate and farinaceous hairs. . . . . 33. **A. farinacea** Rupr.
22. Petals up to 6 mm (in cultivated specimens up to 11 mm). (Arctic) . . . . 29. **A. alpina** L.
+ Petals 11–17 mm long . . . . 23.
175 23. Pubescence white, with not very long hairs. (Crimea, Caucasus) . . . . 30. **A. caucasica** Willd.
+ Pubescence white with very long divergent hairs. (Caucasus) . . . . 31. **A. dolichothrix** N. Busch.
24. Annuals . . . . 25.
+ Perennials or biennials with rosetted leaves at base . . . . 26.
25. Fruiting raceme geniculate-flexuous . . . . 14. **A. auriculata** Lam.
+ Raceme erect, not flexuous. . . . . 13. **A. montbretiana** Boiss.
26. Siliques appressed to axis . . . . 27.
+ Siliques spreading or erect on spreading stalks . . . . 29.

27. Petals 9–10 mm long, rarely 7 mm. Racemes short . . . . 9. **A. stelleri** DC.

+ Petals 4–6 mm long. Racemes long . . . . 28.

28. Stem covered at base with simple and branched hairs. Cauline leaves not congested; auricles obtuse, divergent from stem. Seeds obscurely dotted . . . . 11. **A. hirsuta** (L.) Scop.

+ Stem entirely covered at base with branched hairs. Cauline leaves congested, with auricles acute and appressed to stem. Seeds distinctly dotted . . . . 10. **A. gerardi** Bess.

29. Pedicels more or less pubescent . . . . 30.

+ Pedicels glabrous. Cauline leaves tapering toward base (Cycle A. petraea Lam.) . . . . 32.

30. Cauline leaves tapering toward base, the upper even shortly petioled . . . . 23. **A. arenosa** (L.) Scop.

+ Cauline leaves cordate-amplexicaul . . . . 31.

31. Siliques hirsute . . . . 21. **A. sinuata** Turcz.

+ Siliques glabrous or subglabrous. Stem (mainly at lower part), pedicels, and calyx with coarse simple and bipartite hairs. Leaves covered with minute bi-multipartite hairs. . . . 20. **A. trichopoda** Turcz.

32. Petals 7–10 mm long. Stem glabrous or (rarely) the very lowest internodes slightly hairy. Leaves entire or the radical sinuate-dentate . . . . 28. **A. septentrionalis** N. Busch.

+ Petals 3–7 mm long. Stem glabrous or lower part pubescent . . . . . 33.

33. Radical and sometimes even lower cauline leaves lyrate, shape of the leaves reminiscent of species Barbarea. Petals 3–6.5 mm long . . . . 26. **A. kamtschatica** (Fisch.) Ldb.

+ Leaves differently shaped, entire or emarginate-dentate, sometimes radical leaves lyrate but not resembling leaves of Barbarea . . . . 34.

176 34. Cauline leaves broad, obovate or obovate-oblong, large-toothed, radical leaves entire, orbicular or lyrate, with rounded terminal segment and 1–2 pairs of minute lateral lobes. Stem slender. Petals 5–6 mm long . . . . 24. **A. maximoviczi** N. Busch.

+ Cauline leaves narrower, oblong or oblong-linear, nearly always entire. Radical leaves entire or sinuate-dentate or lyrate-pinnatisect . . . . . 35.

35. Stems tall, densely branched. Petals white, 6–7 mm long . . . . 25. **A. amurensis** N. Busch.

+ Stem simple or branching at base. Petals white or pink, 5–7 mm long . . . . 27. **A. media** N. Busch.

Section 1. **ALLIARIOPSIS** N. Busch, Kavk., vidy r. Arabis L. (1906) 7. — Siliques completely flattened. Perennials with broad leaves resembling Alliaria.

1. **A. nordmanniana** Rupr., Fl. Cauc. (1869) 289; Trautv., Increm. 57; N. Bush, Kavk. vidy r. Arabis L. (1906) 3, 4, 10, 22; N. Busch in Fl. cauc. crit. III, 4 (1909) 496.

Perennial; entire plant covered with forked hairs (seen under magnification); stem erect, simple or branching, 17–60 cm high; crown densely squamose; radical leaves large, 4–9.5 cm long, 4–8.5 cm broad, broadly ovate, slightly cordate, entire or obscurely sinuate or indistinctly denticulate, long-petiolate, cauline leaves 2–4 cm long, 1.5–2.25 cm broad, sessile, ovate, acutely dentate. Flowering raceme subcorymbiform, dense, many-flowered; petals obovai-oblong, 8–12 mm long, 2 to 3.5 times as long as glabrous sepals; fruiting raceme 15–40 cm long; fruiting pedicels mostly 1.5–2 cm long, ascending; siliques 4–6 cm long, thin, 1–1.25 mm broad, torulose, markedly constricted between seeds, arcuately spreading, length of style equal to breadth of silique; seeds black, wingless, elliptic, 1.25–1.5 mm long, 0.75 mm broad. March–May. (Plate IX, Figure 4).

Damp rocks and shady places in mountain forest zones. — Caucasus: W. Transc. Endemic. Described from Abkhazia (Khircha or Khyrka Mountain). Type in Leningrad.

2. **A. christiani** N. Busch, Kavk. vidy r. Arabis L. (1906) 5, 7, 22; N. Busch in Fl. cauc. crit. III, 4 (1909) 498. — A. mollis Stev. in Mém. Soc. Nat. Moscou III (1812) 270, non (Scop.) A. Kerner.; Shmal'g., Fl. I, 56 part. — Cardamina asarifolia S. G. Gmelin, Reis. IV, 108 ?.

Perennial; entire plant covered with stellate hairs (seen under magnification); stem erect, 15–40 cm high, simple or slightly branched, crown 177 without scales; leaves delicate, the radical 2–6 cm long, 2.5–8 cm broad, long-petiolate, cordate, broadly ovate or suborbicular or broader than long, large and obtusely toothed, cauline leaves ovate, cordate-amplexicaul, acutely incised-dentate, 3–10 cm long, 2–5.5 cm broad. Petals white, 12–16 mm long, with oboval patulous limb; fruiting pedicels 6–10 mm, rarely the lower 13 mm long; siliques 3–6.5 cm long, 2.5 mm broad, torulose, constricted between seeds, thickened along margin, with very short style (0.5–1 mm long); seeds rounded, up to 2–2.5 mm long, ca. 1.5–2 mm broad, very flat, rufous or black, with membranous wing one-sixth to one-fifth mm broad. May–July.

Caucasus: Dag., E. Transc. Endemic. Described from Dagestan (source of the Yukharibash River). Types in Leningrad and Helsingfors.

*2. **A. nepetaefolia** Boiss., Fl. Or. I (1867) 177; N. Busch in Fl. cauc. crit. III, 4 (1909) 500.

Perennial, covered with finely farinaceous down of branched hairs (only visible under magnification); crown densely squamose; stem 20–25 cm high, erect, slightly branching; radical leaves 14–25 mm long, 13–25 mm broad, long-petioled, orbicular-cordate, obtusely incised-lobular, 12–14-lobed; cauline leaves sessile, cordate-amplexicaul, ovate, 13–20 mm long, ca. 10 mm broad, acutely incised-dentate with 13–18 teeth; fruiting pedicels 5–6 mm long; siliques 12–25 mm long, ca. 1.5 mm broad, style 0.5 mm long; seeds elliptic, grayish brown, wingless.

Found in Transcaucasia, the Nakhichevan ASSR, and in Talysh. **Gen. distr.:** N. Iran. Described from Iran, in the Elburz Range between Gurgan and Shahrud. Type in Geneva.

3. **A. brachycarpa** Rupr., Fl. Cauc. (1869) 73, 289; Trautv., Increm. 55; Boiss., Fl. Or. Suppl. 35; N. Bush, kavk. vidy r. Arabis L. (1906) 3, 5, 9, 22; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1909) 497.

Perennial, slightly pubescent below (under magnification), glabrous above; stem erect, 13–40 cm high, stoutish, brittle, profusely leafy, simple, crown densely squamose; radical leaves long-petiolate, cordate-orbicular, rarely cordate-broad-ovate, large and obtusely crenate, 2–3.5 cm long, 2–3.5 cm broad; cauline leaves oblong-ovate to broadly ovate, acutely dentate, rarely obtusely crenate, sessile, cordate, auricled, 15—46 mm long, 9—36 mm broad. Sepals 4.5—5 mm long; petals yellow, 9—12 mm long, with patulous limb, oboval-oblong; fruiting pedicels 10.5—12 mm long, rarely up to 16 mm long; siliques short, 13—28 mm long, 2.25 mm broad, constricted between seeds, thickened along margin; style 1.25 mm long; seeds broadly elliptic, 2.5 mm long, 1.75 mm broad, flat, rufous, wingless. (Plate VIII, Figure 1).

178 Rocks of the alpine zone. — Caucasus: Centr. Transc. (Kartlia, Arkhaltsikhe, South Ossetia), S. Transc. **Gen. distr.:** parts of Turkey adjacent to Transcaucasia. Described from the Leninakan District of Armenia near the village of Karakalkhi. Type in Leningrad.

4. **A. secunda** N. Busch in Journ. bot. de l'URSS, 20, No. 1 (1935) 87; Sisymbrium molle Jacq., Ic. pl. rar. I (1781—1786) 12, tab. 122 et Collect. I (1786) 68. — Nasturtium sagittatum R., Br. Hort. Kew. II (1812) 390. — Alyssopsis deflexa Boiss. in Ann. Sc. Nat. Sér. II, XVII (1842) 58. — A. sagittata Boiss., Fl. Or. I (1867) 182; N. Busch in Fl. cauc. crit. III, 4 (1909) 456. — Ic.: Jacq., l. c., tab. 122.

Perennial, wholly (except for siliques) scabrous with branched hairs; stem erect to ascending, branching, indurate below, 20—37 cm high, flexuous above; leaves oblong-lanceolate or oblong, the radical petiolate, runcinate-dentate, cauline leaves sessile, sagittate at base with short auricles, all sinuate-dentate. Sepals 2—2.5 mm long; petals yellow, clawed, 4—5 mm long; fruiting racemes elongate, secund; fruiting pedicels 10—13 mm long, thin, recurved below; siliques glabrous, 6—7 mm long, ca. 1.3 mm broad, curved above, slightly torulose, flattened, valves with a midrib, netted-veined; style half as long as the width of silique. May—June.

Rocks, 1,200—1,800 m. — Caucasus: Tal. **Gen. distr.:** N. Iran. Description does not include habitat. Type in Vienna.

Note. In Jacquin's illustration the plant is depicted with short fruit. Until now all authors have attributed to this plant short fruit, cylindrical and inflated (siliquae turgidae). Because of this, the taxon was separated into the special genus Alyssopsis. However, recent and proper collections reveal that the fruit of this plant is long and flat as in many other species of Arabis; besides, the raceme is secund, which is also quite common in Arabis. In general, all signs indicate that this species is related to Arabis. Since other species of Arabis have been described under the names A. mollis, A. sagittata, and A. deflexa, I gave this species the new name, Arabis secunda N. Busch. The nectariferous glands in Arabis are variable (cf. nectariferous glands of the A. alpina group with glands of other groups). There is no reason to attribute a taxonomic significance to the nectariferous glands.

181 Section 2. **CONRINGIOIDES** Boiss., Fl. Or. I (1867) 165 (part.). — Petals erect. Lateral nectariferous glands annular, the median nearly absent. Seeds uniseriate. Biennials with amplexicaul leaves.

5. **A. laxa** Sibth. et Sm., Prodr. Fl. Graec. II (1813) 28; Boiss., Fl. Or. I (1867) 168; Shmal'g., Fl. I (1895) 56; N. Bush, Kavk. vidy r. Arabis L.

Biennial; stem tall, branching, 50—90 cm high, completely scabrous or only below; radical leaves covered with short branching downy hairs,

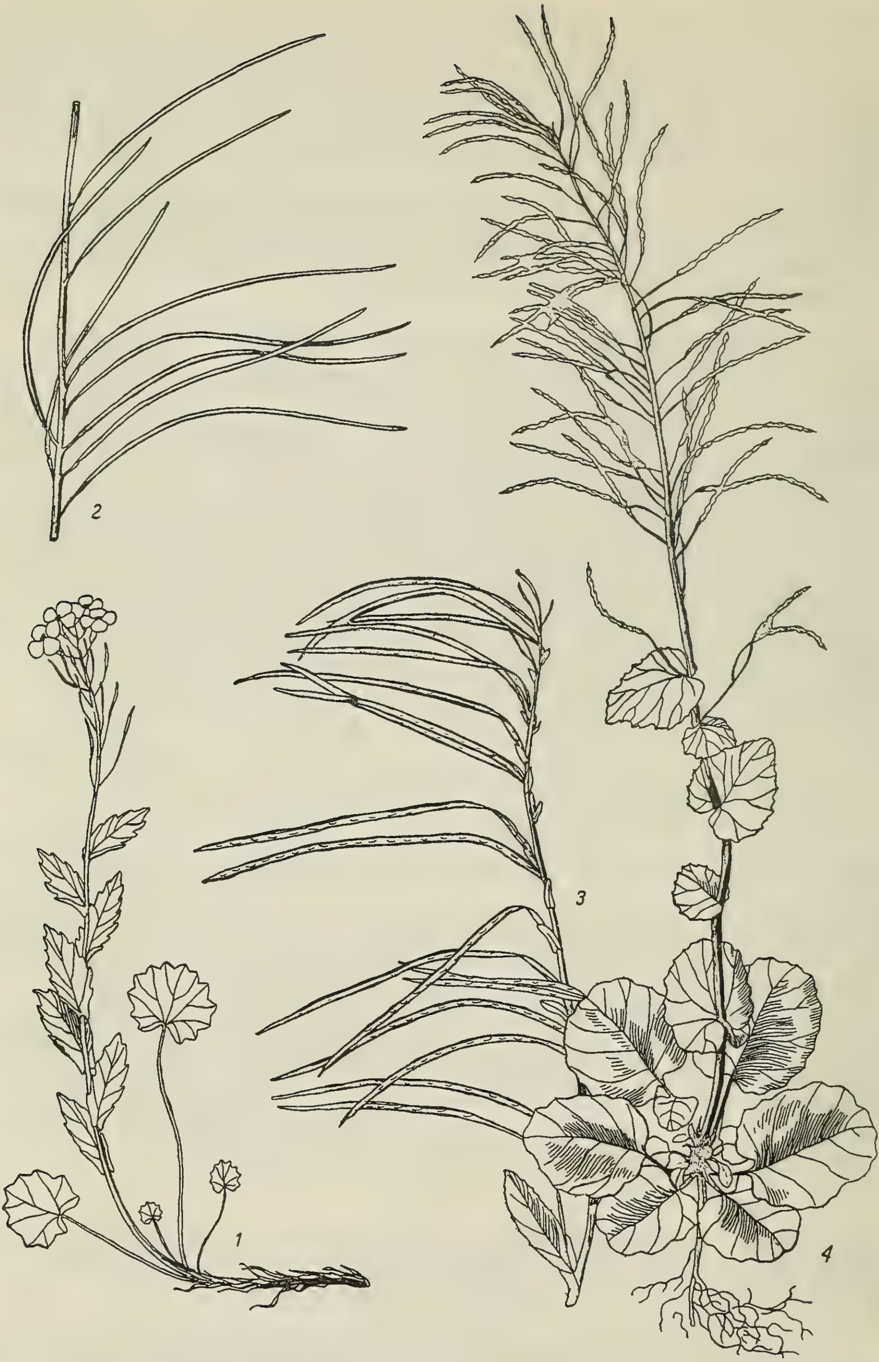

PLATE IX. 1—Arabis brachycarpa Rupr.; 2—A. laxa Sibth. et Sm., fruit; 3—A. turrita L., fruit; 4—A. nordmanniana Rupr.

obtuse, lyrate; cauline leaves oblong, acute, with broad and obtuse auricles, entire, sometimes completely pilose (var. pilosa N. Busch). Racemes very dense; sepals 3—5 mm long, with a tuft of furcate hairs at apex; petals white or straw-yellow, 7—9 mm long; siliques 6.5—12 cm long, sometimes 3—4 cm long (var. brevisiliqua N. Busch), almost straight to arcuate, tetragonous, compressed, spreading with a very long style; seeds narrowly marginate. April—May. (Plate IX, Figure 2).

Forests. — Caucasus: E. Caucasus and E. Transc. Gen. distr.: Greece, Cyprus, As. Min., Syria, eastern parts of Turkey bordering the Caucasus, and, very probably, Iran. Described from Greece. Type in London.

Section 3. **TURRITELLA** C. A. M. in Ldb., Fl. Alt. III (1831) 18 et 23. — Petals erect. Cauline leaves amplexicaul or sessile. Siliques with a slender midrib.

6. **A. pendula** L., Sp. pl. ed. I (1753) 665; Ldb., Fl. Alt. III (1931) 25; Fl. Ross. I (1842) 122; Shmal'g., Fl. I (1895) 58; Kom., Fl. Manchzh. II (1903) 375; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 434; Kryl., Fl. Zap. Sib. VI (1931) 1350. — Ic.: N. Busch, l. c., 435 et tab. geogr. 436.

Perennial; stem simple or branching, 20—200 cm high, stem and leaves covered with simple bristly spreading hairs, on leaves mixed with soft appressed branched hairs; lower leaves tapering to a long petiole, the upper sessile, cordate, oblong-ovate and acuminate or ovate-lanceolate, finely and sparsely toothed; the uppermost leaves lanceolate, subentire. Flowers small; sepals 2.5—3.5 mm long, covered with branched hairs; petals 3.5—5 mm long, white; fruiting pedicels 7—36 mm long; siliques linear, 3—9.5 cm long, 1.75—3.25 mm broad, flattened, glabrous, arcuate and curved, pendulous (declinate below); valves with a prominent midrib; style inconspicuous to 0.5—0.75 mm long; seeds with narrow membranous rim, 2 × 2; 2 × 1.5; 1.5 × 1 mm. June—July.

Birch groves, forest margins, riverbanks, shrub thickets, fallow land, pastures, footpaths and clearings of spruce forests, riparian willow forests, vegetable gardens, and inundated meadows. — European part: east of the 182 Dnieper, V.-Don, L. Don, L. V., Transv.; Siberia: All areas except for the Arctic; Far East: all areas except for the Arctic; Centr. Asia: Balkh., Dzu.-Tarb. Gen. distr.: Mong., Ch. Described from Siberia. Type in London.

7. **A. turrita** L., Sp. pl. (1753) 665; Ldb., Fl. Ross. I (1842) 122; Boiss., Fl. Or. I (1867) 177; Suppl. 34; Shmal'g., Fl. I (1895) 58; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1909) 478. — Ic.: Rchb., Ic. Fl. Germ. tab. XLIV, f. 4345.

Biennial, pubescent with branched hairs; stem 30—80 cm high, erect, nearly simple; all leaves finely toothed, radical leaves elliptic, tapering into a petiole, cauline leaves oblong, obtusely cordate-amplexicaul. Raceme bracteate, secund in fruit; sepals 3—4 mm long; petals 7—10 mm long; pedicels erect, in fruit 5—7.5 mm long; siliques short-pubescent, 10—16 cm long, flattened, moniliform, with thickened margins, curved, valves ribbed, midrib obscure; seeds oval, with broad rim. April—June. (Plate IX, Figure 3).

Forests. — European part: M. Dnp., Bl., Crim.; Caucasus: Cisc., Dag., W. Transc. **Gen. distr.:** S. and Centr. Eur., N. Afr., As. Min., Syria. Described from Europe. Type in London.

8. **A. turczaninovi** Ldb., Fl. Ross. I (1842) 123, 750; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 432. — Turritis? falcata Turcz. in Bull. Mosc. (1840) I No. 7. — A. ? falcata Turcz. in sched. — A. lilacina Rgl., A. H. P. 5, 1 (1877) 267; Trautv., Incr. (1882) 56 (non Schrad.). — Ic.: N. Busch, l. c., 433.

Perennial, glabrous, glaucous; radical leaves tapering into a petiole, obovate-oblong, with stellate hairs, cauline leaves auricled, amplexicaul, subglabrous. Pedicels nearly as long as calyx; sepals 3.25 mm long; petals pink, 9 mm long; fruiting pedicels thin, 12—20 mm long; siliques pendulous, falcate, without prominent veins, glabrous, 3—5 cm long, 1.5 mm broad; style 0.5 mm long; seeds uniseriate in ripe siliques, apparently biseriate in young siliques. June.

E. Siberia: Lena-Kol. (between Chernolesskaya and Alakh). Endemic. Described from Chernolesskaya-Alakh. Type in Leningrad.

Note. Habitat unknown.

9. **A. stelleri** DC., Syst. II (1821) 242; Prodr. I (1824) 148; Ldb., Fl. Ross. I (1842) 122; Kom., Fl. Manchzh. II (1903) 379; Fl. Kamch. II, 187; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 437. — Ic.: N. Busch, l. c., 438 et tab. geogr. 439.

Perennial; stem erect, sometimes branching from base, 15—70 cm high, stem and leaves covered with simple or furcate or coarse branched hairs; 183 lower leaves oblong-spatulate, the upper oblong, semiamplexicaul, serrate-dentate. Raceme dense, many-flowered (more than 20); sepals 4.5—4.75 mm long; petals straw-yellow or white, 9—10 mm long, 2—2.25 mm broad, oblong-cuneate, rarely sepals 3.5—4.5 mm long and petals 6—7 mm long (var. parviflora N. Busch); fruiting pedicels 6—25 mm long; siliques glabrous, 15—75 mm long, 1.25—1.75 mm broad; style 0.75—2 mm long, rarely 0.5—1 mm long (var. eschscholtziana N. Busch); seeds brown, winged, 1.25—2 mm long, 1—1.25 mm broad (incl. wing). May—August.

Dry open slopes (usually grassless) and sometimes shrubby areas, gravels and dry meadows. — Far East: Okh., Uda, Kamch. **Gen. distr.:** Jap., Unalaska Island. Described from Kamchatka. Type in Geneva.

10. **A. gerardi** Bess. in Koch, Synops, Fl. Germ. ed. 1 (1837) 38; Ldb., Fl. Ross. I (1842) 118; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 447 cum tab. geogr. 448; Kryl., Fl. Zap. Sib. VI (1931) 1347. — A. hirsuta subsp. Gerardi Shmal'g., Fl. I (1895) 57.

Annual; stem covered below with only stellate hairs, 40—80 cm high, erect, mostly simple; leaves oblong, denticulate, cauline leaves congested, appressed to stem to half their length, sessile, deeply cordate-sagittate at base, with acute auricles appressed to stem. Sepals 2.5—3.5 mm long; petals white, 5—6 mm long; fruiting pedicels 3—6 mm long; siliques 3.5 cm long, 0.7 mm broad, torulose; valves obscurely veined; style distinct; seeds oval, distinctly dotted. April—June.

Grassless places. — European part: Lad.-Ilm., Dv.-Pech., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don (north), Crim.; W. Siberia: Ob, U. Tob.; Caucasus: W. and E. Transc. **Gen. distr.:** Atl. and Centr. Eur., Bal. (north). Described from Volhynia. Type in Leningrad.

11. **A. hirsuta** Scop., Fl. Carn. ed. 2, II (1772) 30; Ldb., Fl. Ross. I (1842) 118 part.; Shmal'g., Fl. I, 56 excl. subsp.; Kom., Fl. Manchzh. II (1903) 376; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 445 cum tab. geogr. 447; Kryl., Fl. Zap. Sib. VI, 1346. — A. sagittata DC., Syst. II (1821) 222. — Ic.: Rchb., Ic. Fl. Germ. tab. XLI, f. 4342.

Annual; stem and leaves scabrous with branched hairs, mixed at lower part with simple spreading coarse hairs; stem 30—90 cm high, leaves finely toothed, the radical oblong, tapering into a petiole; cauline leaves sessile, ascending, cordate, with divergent obtuse auricles. Sepals 2.5—3.5 mm long; petals white, 5—6 mm long; fruiting pedicels 3.6—9 cm long; siliques 2—6 cm long, erect, linear, flattened; valves longitudinally veined, with prominent 184 midrib, style very short (0.5—0.75 mm); seeds brown, finely dotted, oblong, narrowly winged, together with wing 1—1.5 mm long, 0.75 mm broad. May—July.

Steppes, dry hills, warm slopes and cliffs, dry areas of meadows, and rarely in pine forests. — European part: Lad.-Ilm., Dv.-Pech., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim.; Caucasus: Cisc., Greater Caucasus, W., E., and S. Transc.; W. Siberia: Ob, Alt., Irt.; E. Siberia: Yenis., Lena-Kol., Dau.; Far East: Okh., Ze.-Bu., Uda., Uss. **Gen. distr.:** N. and Centr. Eur., As.-Min., Ch., N. Am. Described from Austria. Type in Vienna.

12. **A. borealis** Andrz. in Ldb., Fl. Alt. III (1831) 25, in nota; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 440. — A. hirsuta Ldb., Fl. Ross. I (1842) 118, part. (non Scop.). — Ic.: N. Busch, l. c., 440 et tab. geogr. 442.

Annual; stem 20—135 cm high, with leaves scabrous with branched hairs, mixed at lower part of stem with simple coarse spreading hairs; leaves dentate, sometimes sinuate-large-toothed (var. subruncinata N. Busch), radical leaves oblong, tapering into a petiole, cauline leaves sessile, ascending, cordate at base, auricles divergent, obtuse. Sepals 2.5—3.5 mm long; petals white, 4—6 mm long; fruiting pedicels 5.1—19 mm long; siliques 4—6.5 mm long, 0.5—1.5 mm broad, erect, linear, flattened; valves longitudinally veined, with prominent midrib; style 0.5—0.75 mm, sometimes 1.25—1.5 mm long (var. longistyla N. Busch); seeds brown, finely dotted, oblong, winged, together with wing 1.25—2 mm long, 0.75—1 mm broad. June—July.

Dry meadows, steppes, mountain slopes, dry hills, forest margins, and dry forest clearings. — European part: Dv.-Pech.; W. Siberia: Ob, Irt., Alt. **Gen. distr.:** Mong. Described from Siberia. Type in Leningrad.

13. **A. montbretiana** Boiss., Ann. Sc. Nat. (1842) 53; Fl. Or. I (1867) 169. — A. sogdiana Kom. in Tr. Spb. O. E. XXVI (1896) 89 p. p.

Annual or biennial; pubescent with branched hairs; stem nearly simple, 15—40 cm high; leaves obtusely dentate, radical leaves oblong, cordate-sagittate at base. Raceme loose; elongating in fruit, erect; pedicels hardly shorter than calyx, in fruit 2—3.5 mm long; siliques 25—55 mm, ascending, somewhat broader than pedicels, flattened, thickened along margin, slightly moniliform, valves with a midrib and finely veined; seeds wingless, with very narrow darker (dark brown) rim, 1 mm long, 0.6—0.7 mm broad, oblong. Fr. May.

Dry mountain slopes. — Centr. Asia: Mtn. Turkm., Amu D., Syr D. 800—1,500 m. **Gen. distr.:** As. Min., Syria, Palestine, Iran. Described from Syria and Palestine. Type in Geneva.

185 Note. In dense maple thickets, this species flowers markedly late producing many branches and lavish foliage (var. sogdiana Kom. in Tr. Spb. O. E. XXVI (1896) 89, part. pro sp.).

14. **A. auriculata** Lam., Encycl. I (1789) 219; Ldb., Fl. Ross. I (1842) 118, 748; Boiss., Fl. Or. I (1867) 169; Shmal'g., Fl. I (1895) 57; N. Busch, in Fl. cauc. crit. III, 4 (1909) 485. — Ic.: Rchb., Ic. Fl. Germ. tab. XXXIX, f. 4334.

Annual, covered with branched hairs; stems branching, slender, 4—36 cm high; leaves slightly dentate, radical leaves oblong, the cauline ovate-oblong, cordate-sagittate at base. Sepals 1.5—3 mm long, petals white, oblong-linear, 3—6 mm long, ca. 1.5 mm broad; fruiting pedicels thick, 3—4 mm long; fruiting raceme loose, geniculate-flexuous; siliques ascending, somewhat broader than the pedicels, flattened, 17—35 mm long, glabrous or shortly and densely hirsute (var. dasycarpa Andrz.); valves convex, with a midrib and 1-nerved on both sides; style one-third the width of the silique; seeds wingless, edged. April—June. (Plate X, Figure 2).

Dry slopes and hills and steppes. — European part: M. Dnp., Bl., L. Don, L. V., Transv., V.-Don, Crim.; Caucasus: Cisc., W. and E. Transc., Dag.; Centr. Asia: Ar.-Casp., Kara K., Balkh., Syr D., Amu D., Mtn. Turkm. **Gen. distr.:** Atl. and Centr. Eur., Bal.-As. Min., Med., Arm.-Kurd., Iran., Ind.-Him. Described from Europe. Type in Paris.

15. **A. fruticulosa** C. A. M. in Ldb., Fl. Alt. III (1831) 19; Ldb., Fl. Ross. I (1842) 119; Kryl., Fl. Alt. I (1908) 68; N. Busch in Fl. Sib. et Or. Extr. IV (1926) 448; Kryl., Fl. Zap. Sibiri VI (1931) 1348. — Ic.: N. Busch, l. c., 449 et tab. geogr. 450.

Shrub, wholly covered with short soft stellate hairs; stem woody at base, creeping, then suberect, branching, covered with remains of dead leaf petioles; upper branches developing herbaceous shoots often short and colorless (5—6 cm long), densely covered with oblong-spatulate entire leaves, tapering at the base into a broad petiole; floriferous shoots 15—26 cm high, bearing 2—3 sessile entire ovate-oblong leaves, acuminate at tip, rounded or rarely somewhat cordate, semiamplexicaul at base. Racemes rather loose; sepals oblong-ovate, 4.5—5.5 mm long; petals purple, pale pink, or white (var. albescens N. Busch), 10—12 mm long, oboval, tapering into a claw; fruiting pedicels 3—8 mm long; siliques erect, linear, flattened, 25—50 mm long, 1.25—1.5 mm broad, torulose, covered with short stellate
186 hairs, with a very short style; valves nearly flat, with a thick midrib; seeds grayish brown, 1.75 mm long, 0.75 mm broad, distinctly dotted, with a hardly conspicuous rim. April—May.

Rocks, stony slopes and hills. — W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Balkh., Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** W. Mong. Described from Altai (Ulba River, Bukhtarminsk, Arkat, Chingis-Tau, Loktevsk). Type in Leningrad.

16. **A. pachyrhiza** Kar. et Kir., Enum. pl. Soong. (1842) No. 65; Ldb., Fl. Ross. I (1842) 729. — Mitophyllum pachyrhizum Schulz in Notizbl. Bot. Gart. u. Mus. Berlin B. XI, No. 109 (1933) 872. — Rhammatophyllum pachyrhizum Schulz in Fedde Repert. sp. nov. XXXIII, 8—17, No. 1873 (882) (1933) 190.

Shrub, root thick, woody, many-stemmed; stems 10—30 cm high; leaves very narrow, subcylindrical, stoutish; leaves, stems, sepals, and siliques covered with simple and Malpighian hairs. Raceme many-flowered; petals whitish, cuneately oboval, twice as long as sepals, blade hardly differing from claw; fruiting pedicels 5—15 cm [sic] long, ascending; siliques more or less curved, sometimes almost straight, moniliform, 3—7 cm long, 1.3—2 mm broad, frequently longer than pedicels; valves 1-nerved, with lateral netted veins, sometimes with only a few hairs; style 1—2.5 mm long; stigma 2-lobed; seeds rimless, 2—2.5 mm long, 1.5 mm broad, brown. May—June. (Plate X, Figure 5).

Rocks and ravines. — Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb. Endemic. Described from Dzungaria (Bishtas Mountain between Ayaguz and the Donsyk stream). Type in Leningrad.

Note. There is no point in separating this species into a special genus, as Schulz has done, based upon the shape of its very narrow cotyledons and very narrow leaves. A. pachyrhiza growing in limestone has far shorter leaves (var. brevifolia N. Busch).

17. **A. erysimoides** Kar. et Kir., Enum. pl. Soong. (1842) No. 66; Ldb., Fl. Ross. I (1842) 749.

Shrub, root woody, fusiform, thick as a goose-feather; stems few (from one root), woody at base, ascending, branching, 20—40 cm high; the whole plant canescent with simple and branched appressed hairs; leaves entire, sessile, cuneate-linear. Apical racemes ebracteate; sepals equal, gray, 4 mm long; petals yellow, cuneate-oboval, twice as long as sepals, 7—8 mm long, blade slightly broader than claw; fruiting pedicels 3—10 mm; style 1 mm long, stigma capitate; siliques densely gray-pubescent, flattened, slightly moniliform, 3—4 times as long as pedicels, 3—6 cm long, 1.5 mm broad. 187

Clay desert. — Centr. Asia: Balkh., T. Sh. Endemic. Described from Dzungaria, from the desert between the Chulak and Ai rivers. Type in Leningrad.

18. **A. kokanica** Rgl. et Schmalh., Pl. Fedtsch. (1882) 6.

Shrub low, covered with branched hairs, tufted, many-stemmed; stems simple, 10—23 cm high; leaves all or nearly all radical, lanceolate to oblong-spatulate, entire or indistinctly few-denticulate, tapering into a short petiole; cauline leaves none or 1 small one, oblong to lanceolate, sessile. Sepals 3—4 mm long; petals lilac or white, 6—7.5 mm long; fruiting pedicels 3—13 mm long, ascending; siliques slightly moniliform, 3—6 cm long, 1.25 mm broad, with very short style (0.3—0.5 mm long), glabrous; valves longitudinally netted-veined; seeds ovate-oblong, brown, 1.5—2.5 mm long, 1—2 mm broad, wingless or with a membranous rim at apex; embryo pleurorhizal. May—June. (Plate X, Figure 4).

Slopes 1,500—3,200 m. — Centr. Asia: Pam.-Al. (Zeravshan, Darvaz, Kokand, Fergana, Pamir, Bukhara, Gissar). Endemic. Described from Kokand. Type in Leningrad.

19. **A. karategina** Lipsky in A. H. P. XVIII (1901) 5.

Perennial, low, densely tufted, many-stemmed, completely covered (except for siliques) with grayish stellate hairs; stems ca. 15 cm high (in fruit); lower leaves oblong-linear, spatulate, entire or rarely with few minute teeth at apex, the radical leaves somewhat dilated below, more indurate, persistent at base of stem; cauline leaves 2 or 3, similar to the lower but smaller. Flowers lilac; siliques flattened, linear, 3—4 cm long, 1 mm broad, borne on declinate or suberect branches, crowded, forming a fan-shaped bundle at summit; fruiting pedicels short, 4—6 mm long; valves with prominent midrib and inconspicuous lateral branching veins; style very short, pointed; seeds uniseriate, small, 1.3 mm long, 0.75 mm broad, wingless or with narrow wing mostly at apex. June—July. (Plate X, Figure 3).

Centr. Asia: Pam.-Al. (Karategin). Endemic. Described from Karategin. Type in Leningrad.

20. **A. trichopoda** Turcz. in Bull. Mosc. (1840) 63, No. 8. — A. eriopoda Ldb., Fl. Ross. I (1842) 749, 787; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 452. — Ic.: N. Busch, l. c., 453 et tab. geogr. 454.

Perennial, scabrous with stellate, bipartite hairs, and simple bristles; 188 stem, pedicels, and sepals with large, simple, and bipartite hairs, leaves with stellate, bipartite, and simple very minute hairs; root pale in color; stem 15—54 cm high; radical leaves oblong, dentate, cauline leaves linear-oblong, sagittate at base, amplexicaul, the lower dentate, upper entire. Sepals 2.5—2.75 mm long; petals white, cuneate, ca. 5 mm long; pedicels pilose, in fruit 5—19 mm long; siliques glabrous, erect, 15—35 mm long, 2—2.75 mm broad; style 0.5 mm long; seeds brown, rimless, 1 mm long, 0.5 mm broad. May—August.

E. Siberia; Lena-Kol. Endemic. Described from Yakutia (between Yakutia and Aldan). Type in Leningrad.

Note. According to Sharypov, in Kolyma the white roots of this plant are used to dust wounds; the dried roots are ground up and the powder is mixed with granulated sugar.

Section 4. **CARDAMINOPSIS** Boiss., Fl. Or. I (1867) 172. — Petals divergent. Cauline leaves tapering into a more or less distinct petiole, radical leaves frequently pinnate.

21. **A. sinuata** Turcz., Decad. quat. in Bull. Mosc. 1840, I, No. 9; Ldb., Fl. Ross. I (1842) 121; N. Busch, Fl. Sib. et Or. Extr. 4 (1926) 457. — Ic.: N. Busch, l. c., 458.

Perennial, tufted, scabrous with stellate and a few 2—3-bipartite and simple hairs; stem ascending, not branched, 5—20 cm high, covered with slender cobwebby tomentum; radical leaves rosetted, tapering into a petiole, obovate-oblong, pinnatipartite, sinuate or dentate; cauline leaves few, linear-cuneate, dentate to entire. Sepals elliptic, 2—2.5 mm long; petals white, oboval, 4.5—5 mm long; fruiting pedicels 3—5 mm long, densely pubescent; siliques densely hirsute with stellate hairs.

E. Siberia: Lena-Kol. Endemic. Described from Chernolesskaya. Type in Leningrad.

Note. The habitat and flowering time of this species are unknown.

22. **A. bucharica** (Lipsky) N. Busch sp. nova in Addenda VII, p. 477. — A. tibetica var. bucharica Lipsky in A. H. P. XVIII, I (1900) 4.

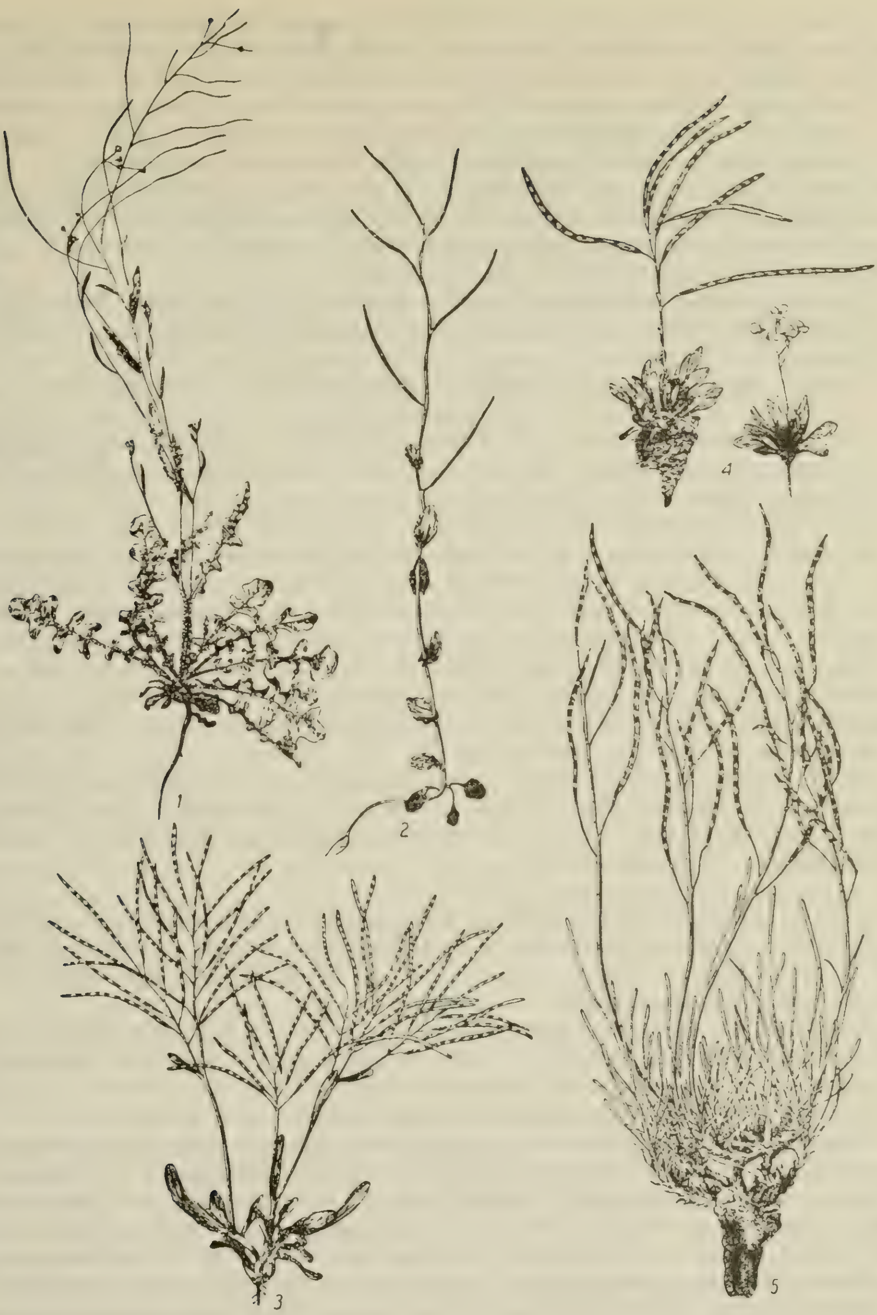

PLATE X. 1—Arabis bucharica (Lipsky) N. Busch; 2—A. auriculata Lam.; 3—A. karategina Lipsky; 4—A. kokanica Rgl. et Schmalh. in fruit and at flowering; 5—A. pachyrhiza Kar. et Kir.

Biennial, canescent with branched hairs; stem erect, branching or many-stemmed from the base, with branches descending and decumbent on the 191 ground; radical leaves rosetted, slightly or deeply pinnatifid or runcinate-lyrate resembling the leaves of Crepis; cauline leaves similar to radical or linear, entire, general shape and size of leaves highly variable. Sepals 2.5—3 mm long, the outer pubescent; petals lilac, very rarely white, 4—5 mm long; fruiting pedicels thin, 8—22 mm long, ascending; siliques thin, pendulous, frequently curved, subtetragonous, with distinct midrib, 3—7 cm long; style 1—2 mm long; seeds brown, elliptic, small, 1—1.2 mm long, 0.75 mm broad. June. (Plate IX, Figure 1).

Clayey slopes, taluses, and glacial moraines. — Centr. Asia: Pam.-Al. Endemic. Described from Gissar, Yakkabag, and Shakhrisyabz. Type in Leningrad.

Note. Specimens with pinnatifid leaves recall A. arenosa Scop.

23. **A. arenosa** (L.) Scop., Fl. Carn. II (1772) 32; Ldb., Fl. Ross. I (1842) 120; Kryl., Fl. Zap. Sib. VI (1931) 1350. — Sisymbrium arenosum L., Sp. pl. ed. I (1753) 658.

Biennial; stem, sepals and sometimes pedicels scabrous with simple spreading hairs; leaves covered with stellate hairs; stem erect to ascending, 20—30 cm, with few leaves, branching; radical leaves lyrate-partite, with 8—12 lateral lobes and large angular-dentate terminal lobes; upper leaves tapering at base into a short petiole, oblong-lanceolate, remotely dentate, simple or 1—2-partite at base. Petals 6—7 mm long, 2.5 times as long as sepals, whitish or pale lilac; siliques borne on thin oblique pedicels, spreading, flattened, with slightly prominent midrib, 20—38 mm long; seeds smooth (even in water). April—June.

Sandy places, rarely in clayey unturfed places. — European part: Lad.-Ilm., U. Dnp., U. V., M. Dnp., Bl., V.-Don, L. Don, L. V. Gen. distr.: N. and Centr. Eur. to France, northern Italy, Yugoslavia, Bessarabia, Bulgaria. Described from Austria. Type in London.

24. **A. maximoviczi** N. Busch in Not. syst. Horti Petrop. III, 3—4 (1922) 13; in Fl. Sib. et Or. Extr. IV (1926) 473. — A. halleri, Maxim. in schedis; Kom., Fl. Manchzh. II (1903) 378 (non L.). — Ic.: N. Busch, Fl. Sib. et Or. Extr. IV (1926) 473 et tab. geogr. 460.

Biennial; stem tall, slender, glabrous or scabrous with long simple hairs; radical leaves lyrate with 1 or 2 pairs of small lateral lobes or none and a suborbicular terminal lobe, sometimes entire, the cauline rather large and broad, obovate to oblong, large-toothed, all covered with simple or 2—3-partite hairs or glabrous. Lateral nectariferous glands horseshoe-shaped, open outside, with internal and lateral appendages, the median glands 192 form small cushions, usually with an internal umbo; pedicel and sepals with simple and furcate hairs; sepals 2—2.5 mm long; petals white, 5—6 mm long; epidermis of septum consisting of a broad median strand of long narrow cells with thin wavy walls and of two lateral strands of short, broad and not elongated cells, also with thin but more wavy walls; style ca. 1 mm long; siliques glabrous, narrowly linear, with 1 very thin vein. May—June.

Stony and dry places. — Far East: Uss. (basin of the Ussuri, Vladivostok, Putyatin Island). **Gen. distr.:** Korea, Jap. Described from the former S. Ussuri Territory. Type in Leningrad.

25. **A. amurensis** N. Busch in Not. syst. Horti Petropol. III, 3–4 (1922) 12; Fl. Sib. et Or. Extr. IV (1924) 470. — A. ambigua b. major Turcz., Fl. I (1842) 116. — A. petraea var. prolifera Ldb., Fl. Ross. I (1842) 120. — A. petraea var. grandiflora Kom., Fl. Manchzh. II (1903) 379. — Ic.: N. Busch, Fl. Sib. et Or. Extr. IV (1926) 472 et tab. geogr. 460.

Annual; stem tall, many-branched, glabrous,(base and radical leaves) covered with 2–3–4-partite hairs, sometimes stem glabrous and leaves entirely pilose-strigose (var. scabra N. Busch); radical leaves lyrate-pinnatifid or sinuate, cauline leaves oblong, dentate or entire, glabrous. Sepals 2.5–3.5 mm long; petals 6–8 mm long; lateral nectariferous glands closed inside, open to closed outside of shorter stamens, most often 3-lobed with the inner lobe slightly bifid; median nectariferous glands small, often 2- rarely 3-lobed; epidermis of septum with broad median strand of long cells with thin and undulate walls, lateral cells much shorter and broader with walls also thin and sinuous; style 0.3–0.6 mm long, siliques glabrous, narrowly linear. May–July.

Sandy places and rocks. — Far East: Ze.-Bu., Uss. (Amur Valley). Endemic. Sakh. Described from Amur and Sakhalin. Type in Leningrad.

26. **A. kamtschatica** Fisch. in DC., Syst. II (1822) 231; Ldb., Fl. Ross. I (1842) 121; B. Busch in Not. Syst. H. P. III, 3–4 (1922) 11; Fl. Sib. et Or. Extr. IV (1926) 466. — A. lyrata Kom., Fl. Manchzh. II (1903) 377. — Ic.: N. Busch, Fl. Sib. et Or. Extr. IV, 467 et tab. geogr. 460.

Annual or perennial; stem simple or branching, glabrous or scabrous with simple hairs; radical leaves resembling those of Barbarea, lyrate, with terminal lobe usually large; lower cauline leaves pinnatifid or
193 dentate, glabrous or scabrous with simple or 2–3-fid hairs; upper linear or oblong, entire, glabrous. Sepals 1.75–3 mm long; petals white, rarely lilac pink (var. lilacina N. Busch), 3–6.5 mm long; lateral nectariferous glands open outside, closed at inner side of shorter stamens, slightly sinuate, with extrorse ends, slightly 2-lobed; median glands horseshoe-shaped outside longer stamens outwardly open; epidermis of septum consisting of long cells with thin wavy walls; style 0.3–0.6 mm long; siliques glabrous, narrowly linear, 15–40 mm long, sometimes 45–50 (var. longisiliqua N. Busch). May–August.

Sandy places, gravels, grassless slopes. — Arctic: Chuk., An.; Far East: Okh., Kamch. **Gen. distr.:** Mountains of northern Japan. Described from Kamchatka. Type in Leningrad.

27. **A. media** N. Busch in Not. Syst. H. P. III, 3–4 (1922) 11; Fl. Sib. et Or. Extr. IV (1926) 463. — A. ambigua DC., Syst. II (1821) 231 et Pr. I (1824) 145 (part.). — A. umbrosa. Turcz. in Ldb., Fl. Ross. I (1842) 120 quoad var. glabram. — A. petraea Ldb., l. c., (part). — A. halleri Ldb., Fl. Ross. I, 121 (part., non L.). — Ic.: N. Busch, Fl. Sib. et Or. Extr. IV (1926) 464 et tab. geogr. 460.

Annual, rarely perennial; stem simple or usually branching from base, glabrous or pilose at lower part; radical leaves oblong-ovate, entire or sinuate-dentate, petioles often ciliate; cauline leaves oblong-linear, entire, all glabrous or pilose, usually narrower than in A. septentrionalis N. Busch; in var. glabra (DC.) N. Busch stem and all leaves glabrous, in var. angustifolia N. Busch all leaves oblong-linear, pubescent, in var.

glandulosa N. Busch stem, leaves, and pedicels glandular, leaves medium broad. Sepals 2.5—3 mm long; petals white or pink, 5—7 mm long; lateral nectariferous glands open outside, 3-lobed, median lobe sometimes slightly incised, median nectariferous glands small, 2-lobed; epidermis of septum consisting of long cells with thin sinuous walls; style 0.3—0.6 mm long; siliques glabrous, erect or patent on divergent pedicels, narrowly linear, rather flattened, with very thin midrib; seeds rimless, brown. May—July.

Sandy, stony places, and rocks. — Arctic: An.; East Siberia: Yenis., Lena-Kol., Ang.-Say., Dau. Endemic. Described from East Siberia. Type in Leningrad.

28. **A. septentrionalis** N. Busch in Not. Syst. H. B. P. III, 3—4 (1922) 10; Fl. Sib. et Or. Extr. IV (1926) 460; Kryl., Fl. Zap. Sib. VI (1931) 1349. — Ic.: N. Busch, Fl. Sib. et Or. Extr. IV (1926) 461 et tab. geogr. 460. —

Perennial, more or less tufted; stems usually many, glabrous, very rarely slightly pilose at lower internodes, more rarely pubescent from
194 below upward (var. saviczi N. Busch); leaves rosetted, oblong-obovate, entire or sinuate-dentate, glabrous or pilose; cauline leaves oblong to oblong-linear, entire, glabrous. Sepals 2.5—3.5 mm long, sometimes 4—4.5 mm long (var. grandiflora N. Busch); petals 7—10 mm long, white, rarely pink, or pale lilac (var. subviolacea N. Busch); lateral nectariferous glands with 3 large lobes, nearly closed even outside, median glands with 3 small rounded lobes; epidermis of septum without median strand, consisting of equal, long, thin-walled cells with wavy walls; style 0.3—0.6 mm long; siliques glabrous, erect or patent, on glabrous divergent pedicels, narrowly linear, rather flattened, with very thin midrib; seeds rimless, brown. May—August.

Sandy places, riverbanks, rock streams, rocks, and mottled tundra. — Arctic: Nov. Z.; northeastern tundra of the European part of the USSR; Arc. Sib.; W. Siberia: Ob; E. Siberia: Yenis., Lena-Kol. Endemic. Described from Arctic Siberia and Novaya Zemlya. Type in Leningrad.

Section 5. **EUARABIS** C. A. M. in Ldb., Fl. Alt. III (1831) 18. — Petals divergent. Nectariferous glands elongated outwardly. Gray-pubescent with rigid hairs; cauline leaves amplexicaul.

29. **A. alpina** L., Sp. pl. ed. 1 (1753) 664; Ldb., Fl. Ross. I (1842) 117; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 454; Kryl., Fl. Zap. Sib. VI, 1349. — Ic.: N. Busch, l. c., 455.

Perennial; stems 5—32 cm long, floriferous stems ascending, the sterile elongated, decumbent; leaves grayish due to rigid branched hairs, radical leaves obovate, oblong, cauline leaves cordate-sagittate, amplexicaul. Sepals 3.5—4, in cultivated specimens up to 4.5 mm long; petals white, 5—8, in cultivated specimens up to 11 mm long; fruiting pedicels 9—15 mm long; siliques spreading, glabrous, obscurely constricted, thickened along margin, 2.3—6.5 cm long, 1—2 mm broad; valves not prominently veined; seeds with a narrow membranous wing at margins. June—August.

Sandy places, pebbly slopes of the tundra and forest-tundra, but rarely in the forest zone. — W. Siberia: Ob (northern Urals, Kara, former Turukhansk Territory); Far East: Okh., Kamch. **Gen. distr.:** N. (Scand.) and Centr. Eur. (high-mountain zone). Described from Europe. Type in London.

30. **A. caucasica** Willd., Enum. h. B. Suppl. (1813) 45. — A. albida Stev. in Fisch., Catal. H. Gorenk. (1812) 51, nomen; Ldb., Fl. Ross. I (1842) 117, 748; Boiss., Fl. Or. I (1867) 174, Suppl. 33; N. Busch, Kavk. vidy r. Arabis 15; N. Busch in Fl. cauc. crit. III, 4 (1909) 488.

195 Perennial, canescent or white-tomentose plant; simple or slightly branching, 10—35 cm high; radical leaves obovate-oblong, obtuse, tapering into a short petiole, cauline leaves ovate to oblong, sessile, cordate-amplexicaul, all sparsely dentate. Raceme glabrous (var. gymnostachya N. Busch) or hirsute (var. trichostachya N. Busch); sepals 4.5—7 mm long; petals white, 11—17 mm long, blade oboval, abruptly tapering into a claw; fruiting pedicels divergent, 10—14 mm long; siliques linear, flattened, moniliform, ascending, 2.5—6.5 mm long, 1.5—2 mm broad, glabrous or rarely puberulent (var. puberula N. Busch); seeds dark brown, 1.25—1.5 mm long, 1—1.25 broad, orbicular, with narrow rim. March—May.

Rocks. — European part: Crim.; Caucasus: W. Transc., Dag., E. and S. Transc.; Centr. Asia: Mtn. Turkm., western T. Sh., Pam.-Al. **Gen. distr.:** Sicily, Greece, Crete, Bulgaria, N. Afr., As. Min., Arm.-Kurd., Iran., Syria. Described from the Caucasus (near the Akstafa River, 1805. Stev.!). Type in Berlin.

Economic importance. An excellent nectar plant. Like other species of the Euarabis section, it is a suitable ornamental plant.

31. **A. dolichothrix** N. Busch in Addenda VII, p. 478. — A. albida var. dolichothrix N. Busch, Kavk. vidy r. Arabis L. (1906) 19 et in Fl. cauc. crit. III, 4 (1909) 495.

Perennial, canescent with very long spreading hairs on stem and petioles of lower leaves, less long-pubescent on leaf blades and raceme; stem simple or slightly branched; radical leaves obovate-oblong, obtuse, tapering into a short petiole, cauline leaves ovate to oblong, sessile, cordate-amplexicaul, all sparsely dentate. Petals white, blade oboval, abruptly clawed; fruiting pedicels divergent; siliques linear, flattened, moniliform, ascending; seeds darkly grayish brown, rounded, narrowly marginate. May.

Rocks. — Caucasus: E. Transc. (Shemakha). Endemic. Described from the environs of Shemakha. Type in Leningrad.

32. **A. ionocalyx** Boiss., Diagn, Ser. I, VIII (1849) 20; Boiss., Fl. Or. I (1867) 176; Fedtsch., Consp. (1906) 41. — A. albida var. umbrosa Litv., Rast. Zakasp. obl. I. in Trav. d. Mus. bot. Ac. Sc. St.-Pétersb. I (1902) 33.

Perennial, pubescent with simple and branching white hairs; stems erect, branching almost from base; leaves grayish, the radical rosetted, obtuse, oblong-spatulate, short-petiolate, deeply dentate or lyrate, pinnatifid or bipinnatifid, cauline leaves oblong-linear, dentate or pinnatifid, cordate-
196 amplexicaul at base. Calyx violet, ca. 5 mm long, glabrous or with few hairs at apex; petals white, 9—10 mm long, oblong, generally tapering into a reddish claw; fruiting pedicels 9—12 mm long; siliques ascending, glabrous, 3—5 cm long, 1 mm broad, valves convex with lateral veins slightly thinner than midrib; seeds nearly wingless. April—May.

Damp shady places in mountain canyons at ca. 1,600—2,000 m. — Centr. Asia: Mtn. Turkm. (Kopet-Dagh). **Gen. distr.:** As. Min. Described from Asia Minor. Type in Geneva.

Note. Differs from A. caucasica Willd. by its scabrous pubescence which is not short-tomentose, by the erect stems, the deeply-dentate or pinnate-lyrate, often bipinnate-lyrate leaves, and the violet calyx.

33. **A. farinacea** Rupr., Fl. Cauc. (1869) 71. — A. albida var. farinacea Boiss., Fl. Or. Suppl. (1888) 34; N. Bush, Kavk. vidy r. Arabis L. (1906) 19; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1909) 404.

Perennial, low, wholly farinaceous-pubescent with stellate very short and very dense hairs (even near raceme); stem simple or somewhat branched, 10—20 cm high; leaves small, obovate-spatulate, incised-dentate or subpinnatifid, usually tapering into a long petiole. Petals white, yellow only at corolla-mouth, when dry wholly yellow; fruiting pedicels divergent; siliques linear, flattened, moniliform, ascending; seeds dark brown, orbicular, narrowly rimmed. July.

Caucasus: Dag. (2,300—2,600 m) (Bogos Range). Endemic. Described from the Bogos Range in Dagestan. Type in Leningrad.

Note. Is distinguished from A. flaviflora Bge. and A. caucasica Willd. by its uncommonly short and dense farinaceous pubescence.

34. **A. flaviflora** Bge. in Mém. Acad. Sc. St.-Pétersb. (1859), VI Sér., T. VI, 582, No. 26; Boiss., Fl. Or. I (1867) 176; Suppl. 34; N. Bush, Kavk. vidy r. Arabis L. (1906) 18. — A. albida var. flaviflora Trautv. in A. H. P. II, 2 (1873) 496; N. Bush, Kavk. vidy r. Arabis L. (1906) 18; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1909) 493.

Perennial, grayish with white pubescence; stems simple or somewhat branching, 10—35 cm high; radical leaves obovate-oblong, obtuse, tapering into a short petiole, cauline leaves ovate to oblong, sessile, cordate-amplexicaul, all sparsely dentate. Sepals 4.5—7 mm long; petals pale or bright yellow, 11—15, sometimes up to 18 mm long, blade oboval, abruptly clawed; fruiting pedicels divergent, 10—14 mm long; siliques linear, flattened, moniliform, glabrous, ascending, 2.5—5 mm long, 1.5—2.5 mm broad; seeds dark brown, rounded or elliptic, with narrow rim. May—July.

197 Rocks, taluses, and moraines of the high-mountain zone. 1,700—3,000 m. — Caucasus: Gr. Caucasus, W. and S. Transc. Gen. distr.: As. Min., Iran. (Savalan, Ararat). Described from Ararat. Type in Leningrad.

35. **A. billardieri** DC., Syst. II (1821) 218; N. Busch in Fl. cauc. crit. III, 4 (1909) 405. — Ic.: Delessert, Ic. sel. II, tab. 24.

Perennial, gray-tomentose plant; stems 25—30 cm high, slender, hairy below, glabrous above; radical leaves white-tomentose, 2—4 cm long, 8—15 mm broad, obovate, obtuse, tapering into a petiole, cauline leaves auricled at base, sessile, 3—4.5 cm long, 1—2.5 cm broad, more delicate, less tomentose, all with 3 or 4 denticles on both sides. Raceme glabrous; sepals ca. 5 mm long; petals white, like in A. alpina L.; siliques narrowly linear, completely glabrous, 3—5 cm long, 1—1.25 mm broad, 3—5 times as long as pedicels; style 0.5—0.75 mm long; stigma small, capitate; seeds oblong-subrectangular, 1 mm long, 0.6—0.7 mm broad, without rim.

Rocks and forests. — Caucasus: W. Transc. (Batumi). **Gen. distr.:** As. Min., Syria, S. Iran. Described from Syria (Djebel-Kher, near Damascus). Type in Geneva.

Genus 595. **STEVENIA** * ADAMS et FISCH.**

Adams et Fisch. in Mém. Soc. Nat. Mosc. V (1817) 84. — Arabis sec. Stevenia Hook. f. in Benth. et Hook. f., Gen. I (1862) 69.

Sepals divergent, saccate at base. Petals long-clawed, white, pink, or light purple. Filaments edentate. Lateral nectariferous glands forming a pair of triangular tubercles at inner base of each shorter stamen; median glands absent. Ovary sessile. Style long, thin. Stigma bilobate or emarginate. Fruit long, linear, polyspermous or very short, 1—2-spermous. Valves flat, without midrib. Septum thin, consisting of cells separated by numerous parallel walls of a row of narrow cells, in the adjacent large cells the division is in a different direction. Seeds flattened, wingless, uniseriate. Cotyledons flat. Embryo pleurorhizal. Hairs branched. — Perennials or biennials. Three species, native to the mountains of Siberia, northern Mongolia, and Korea.

1. Petals purple or pink, rarely white. Siliques 9—35 mm long, polyspermous . . . . 2.
+ Petals white. Siliques 6—8.5 mm long, 2—4-spermous . . . . 2. **S. alyssoides** Adams et Fisch.
198 2. Perennial, densely gray-pubescent. Petals 6—8 mm long . . . . 1. **S. cheiranthoides** DC.
+ Biennial, less densely pubescent. Petals 3—4 mm long . . . . 3. **S. axillaris** (Kom.) N. Busch.

1. **S. cheiranthoides** DC., Syst. II (1821) 210; Prodr. I (1824) 141; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 476. — Cheiranthus fruticulosus J. Meyer, Abh. Boehm. Ges. (1786) 237, non L., non Georgi. — Arabis incarnata Pall. in herb. Lamb. ex DC., Syst. II (1821) 210; Ldb., Fl. Alt. III (1831) 22; Fl. Ross. I (1842) 119; Kom., Fl. Manchzh. II (1903) 379. — Ic.: N. Busch, l. c., 477 et tab. geogr. 481.

Perennial; the whole plant, especially leaves, canescent with branched hairs; stem usually many-branched, 3—42 cm high; leaves linear-oblong, entire, sessile, somewhat tapering at base, radical leaves rosetted. Sepals 3—4 mm long, oblong; petals purple-pink (var. violascens N. Busch), sometimes white (var. albiflora N. Busch), 6—8 mm long, blade orbicular, claw long; fruiting pedicels 4—15.5 mm long; siliques obliquely declinate, 9—35 mm long, 1.5 mm broad, flattened, sometimes 5.5—9 mm long (var. brachycarpa N. Busch); valves flat, granular, without midrib; style 0.5—1.5 mm long (var. longistyla N. Busch); seeds brown, 1.25 mm long, 1 mm broad. May—July.

Rocks, stony slopes, taluses, and solonetzic steppes. — W. Siberia: Alt., Irt.; E. Siberia: Ang.-Say., Dau. **Gen. distr.:** N. Mong. Described from stony hills west of the town of Gazimur (Dauria). Type in Geneva.

2. **S. alyssoides** Adams et Fisch. in Mém. Soc. Nat. Mosc. V (1817) 84; DC., Syst. II (1821) 209; Prodr. I (1824) 141; Ldb., Fl. Ross. I (1842) 123; N. Busch, Fl. Sib. et Or. Extr. IV (1926) 481. — Ic.: N. Busch, l. c., 482 et tab. geogr. 483.

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* In honor of Christian Steven.

** Treatment by N.A. Bush.

Biennial; rootstock thin, fusiform, somewhat branching at summit; stem 5—40 cm high, cylindrical, branching, ascending from base or completely erect, stem, leaves, pedicels, and siliques covered with branched hairs; leaves green, sessile, oblong-cuneate, obtusish, entire. Flowering raceme corymbiform, elongating in fruit; sepals linear; petals white, clawed, claws equal to sepals, blade suborbicular and of the same length; stamens free, subulate from base; fruiting pedicels 7—10 mm long; siliques 6—8 mm long, 2.5—3.25 mm broad, densely gray-pubescent; style 1.5—3 mm long; stigma small, emarginate; seeds 3—4 in one cell, sometimes 1—2 in siliques 3—4.5 mm long (var. monosperma N. Busch), black, rimless, 1.5—1.75 mm long, 1.25 mm broad. June—August. 199

River gravels. — E. Siberia: Ang.-Say., Dau. **Gen. distr.**: N. Mong. Described from the Verkhoyansk Range, on gravels of the Lena River below Zhigansk. Type in Leningrad.

Note. Description by DC. in Syst. 209. On the label of the original Adams specimen in the BIN herbarium of the Akad. Nauk SSSR, there is only the word "Siberia."

★3. **S. axillaris** (Kom.) N. Busch comb. nova. — Arabis axillaris Kom. in A. H. P. XVIII (1901) 437; Fl. Manchzh. II (1903) 378.

Biennial, erect; stem branching above, covered with stellate hairs; radical leaves small, rosetted, white-tomentose, obovate, entire to lyrate, with 2 lateral leaflets withering at flowering time, cauline leaves obovate-oblong, very short-petioled, 1 vein, slightly acuminate or obtuse at apex, pilose, 0.8—2 cm long, 3—6 mm broad, bearing minute branchlets in axils, often with one leaf. Floriferous branches arcuate, leafy; flowers partly arranged in few-flowered apical corymbs, partly axillary; pedicels shorter than flowers; sepals not [?] saccate, pilose; petals clawed, 5—7-nerved, white or pink, nearly twice as long as calyx; filaments thin, violet; siliques flattened, gray-tomentose, up to 2 cm long, ca. 1 mm broad, shortly tapering at tip, style short, stout, much thinner than silique; seeds ellipsoidal-oblong, wingless, smooth.

Rocks and stony places. Described from North Korea from the valley of the Unchkhen-Kang River, a tributary of the Yalu River. Type in Leningrad.

Note. Described in case it might be found in the USSR.

Genus 596. **BORODINIA** * N. BUSCH**

N.Busch in Not.Syst.Herb.H.B.P.II, 35 (1921) 137—140; Fl.Sib. et Or. Extr.6 (1931) 491.

Sepals erect, the lateral slightly saccate. Petals oblong, clawed, yellow. Filaments edenticulate, somewhat dilated at base. Lateral nectariferous glands pentagonal-annular at base of shorter stamens, open inside, rarely closed, median glands connate with lateral marginal lobes, the middle lobe strongly or weakly developed. Ovary on short gynophore or subsessile. 200 Style long. Stigma tiny, capitate. Silique linear, bivalvular; valves flat, without midrib. Septum thin, the epidermal cells irregularly polygonal, with walls coarsely undulate. Seeds uniseriate, flattened, narrowly winged.

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* After I.P.Borodin.

** Treatment by N.A.Bush.

Cotyledons flat, embryo pleurorhizal. Hairs furcate (Malpighian) and simple. Monotypic genus native to the shores of Baikal; probably an ancient genus.

1. **B. baicalensis** N. Busch in Not. syst. H. B. P., II, 35 (1921) 137–140; Fl. Sib. et Or. Extr. 6 (1931) 491. — Ic.: N. Busch, Not. syst. H. B. P II, 35, p. 140, 141; Fl. Sib. et Or. Extr. 6 (1931) 492. — Exs.: HFR No. 6245.

Perennial, pulvinate; roots very long, stout, branching; stem stout, many-branched; branches covered by old leaf relics, 2—20 cm long; floriferous stems 2—6-leaved, 3—12-flowered, 2—9 cm long, in fruit 4—11 cm high; radical leaves spatulate, coarsely and remotely dentate, rosetted, 2—5 cm long (blade up to 3.5—9 mm broad, short-acuminate, tomentose with forked and simple mixed hairs), tapering into a petiole 1—3 cm long, covered with long ciliate and furcate hairs; leaves of floriferous stems sessile, oblong, entire or slightly dentate, much smaller than the radical, 0.8—1.7 cm long, ca. 2 cm [sic] broad, ciliate mainly along margin with rather long furcate hairs. Sepals oblong, 3.5—7 mm long; petals oblong with a rather long and narrow claw, 6.75—8 mm long, 2—2.5 mm broad; shorter stamens equal to petals, the longer stamens exceeding petals by 1 mm; filaments edenticulate, dilated (especially of shorter stamens); fruiting pedicels 5—12 mm long; silique linear, sometimes arcuate, 2.5—3 cm long, 1.5—2.25 mm broad, without gynophore or with gynophore to 1.25 mm long; style 1—2 mm long; seeds brown, immature seeds ca. 1.5 mm long, ca. 1 mm broad. May—June.

Stony places and bald mountains, rocky crevices of Transbaikalia. — E. Siberia: Dau. Endemic. Described from Svyatoi Nos, 1,200—1,300 m. Type in Leningrad.

Note. In Engl. Bot. Jahrb. LXVI (1933) 97, Schulz named this taxon B. macrophylla with Draba macrophylla Turcz., Fl. baic.-dahur. I (1842) 137 as its synonym. I have not seen the Turchaninov specimen, and in his diagnosis there is little with which to characterize this plant.

Genus 597. **PHYSALIDIUM** * FENZL**

Fenzl in Tchihatsch., Asie Mineure Bot. I (1860) 327; Hayek, Crucif.-Syst. (1911) 209.

Sepals equal, divergent. Petals short-clawed, white. Filaments simple, subulate. Lateral nectariferous glands pentagonal-annular around the base 201 of the shorter stamens, broadly united with the median glands into a closed ring; ovary sessile; style short, filiform, stigma small, emarginate or capitate. Fruit a narrowly elliptic silicle, acuminate at both ends, bivalvular, dorsally flattened, valves thin-walled, scaphoid, netted-veined; seeds 1 or 2 in each cell, flattened, hanging from a large placenta; cotyledons flat, embryo pleurorhizal, without hairs. — Perennial with a woody rootstock.

Bitypic. Iranian-Central Asian genus, represented in the flora of the Soviet Union by one species. The second species P. stylosum Boiss. is an Iranian plant.

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* From Physalis — genus of the Solanaceae and eidos — species.

** Treatment by N.A.Bush.

1. **P. graellisiaefolium** Lipsky in A. H. P. XVIII (1900) 12 et XXIII (1904) 75.

Perennial, glabrous plant, rootstock multicipital, covered at summit with stems and old leaf relics; stems slender, numerous, shiny, simple, 25—35 cm high, very few-leaved (1) or leafless; radical leaves long-petiolate, reniform, 5-lobed, sometimes subentire, often broader than long, cauline leaves 3-lobed or entire or absent. Flowers white; fruiting racemes rather loose, fruiting pedicels thin, somewhat thickened above, 10—16 mm long, ascending; silicles glabrous, compressed but inflated, broadly linear, irregularly flexuous or bent, 6—10 mm long, (1.5)—2—4 mm thick, valves scaphoid, netted-veined, convex; seeds biseriate, black, dotted-pitted (under powerful magnification), embryo pleurorhizal; septum thin, strandless, narrow, broader below or above, frequently perforated in the broader part; style 1—1.5 mm long. June.

Rocks and glacial moraines, 2,000—3,200 m. — Centr. Asia: Pam.- Al. Endemic. Described from Darvaz (Tikharvi glacier) and Gissar (gorge of Rustambest River, a tributary of the Sorbo River). Type in Leningrad.

Genus 598. **GRAELLSIA** * BOISS.**

Boiss. in Ann.Sc.Nat.Sér.2, XVII (1842) 172; Hayek, Crucif.-Syst. (1911) 210.

Sepals equal, divergent. Petals short-clawed, white. Filaments edentate, free. Lateral nectariferous glands annular at base of shorter stamens, deeply emarginate inside and outside, united with the median glands into a closed ring; ovary on a short gynophore, style short, stigma capitate. Fruit a silicle, flattened dorsally, obliquely oboval, bivalvular; valves flat, thin-coriaceous, somewhat netted-veined, septum delicate, with
202 undulant epidermal cells, finally disappearing; seeds 1, lenticular, on a free delicate funicle; cotyledons flat, embryo pleurorhizal; without hairs. — Perennial, resembling Saxifraga rotundifolia L.

Monotypic genus native to the Soviet part of Central Asia and to Iran.

1. **G. saxifragifolia** (DC.) Boiss., Ann. Sc. Nat. (1842) 172; Boiss., Fl. Or. I (1867) 307. — Cochlearia saxifragifolia DC., Syst. II (1821) 370.

Perennial, glabrous; rootstock stout, multicipital, densely beset in upper branches with decayed leaf relics and stems; stems few, 15—35 cm high, branching, slender, nearly subaphyllous, shiny like the leaves; radical leaves long-petiolate, reniform, often broader than long, palmately cleft into 5—9 lobes, acute or obtuse, sometimes leaves entire, cauline leaves 1 or 2, small, 3-lobed or elliptic or linear-entire, or often absent. Racemes dense, elongating in fruit a little only; sepals [?] oblong-ovate to suborbicular, not emarginate at apex, short- or longer-clawed [sic]; fruiting pedicels very thin, filiform, slightly thickened at tip, 8—14 mm long, ascending or patulous; silicles 8—10 mm long, 4—5 mm broad, sometimes rather larger and more compressed at base (var. yezdana Boiss.); seeds blackish brown, flattened, suborbicular, 2.5 mm long, 2 mm broad, densely dotted with minute tubercles (under powerful magnification); style very short, inconspicuous. March—May.

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* After the zoologist Mariano Graells, a Madrid professor.

** Treatment by N.A.Bush.

Shady rocks (rootstock in crevices) and stony places to 2,300 m and even higher. — Centr. Asia: Mtn. Turkm. (Kopet-Dagh). **Gen. distr.**: N. and central Iran. Described from N. Iran, from the town of Alwand. Type in Geneva.

Genus 599. **MYAGRUM** * L.**

L., Sp. pl. (1753) 640; Gen. ed. 5 (1754) 289.

Sepals erect, the lateral slightly saccate at base. Petals yellow. Filaments simple. One simple nectariferous gland at base of shorter stamens, emarginate inside, open outside, connate to the median glands into a ring. Ovary sessile. Style short. Fruit indehiscent, obpyriform, with 2 inflated hollow cells, the lower a fertile monospermous cell. Cotyledons flat or slightly curved, embryo notorrhizal. Glabrous, glaucous annuals with entire leaves.

1. **M. perfoliatum** L., Sp. pl. (1753) 640; DC., Syst. II (1821) 574 et Prodr. I (1824) 212; Ldb., Fl. Ross. I (1842) 214; Boiss., Fl. Or. I (1867) 371; N. Busch, Fl. cauc. crit. III, 4 (1908) 229. — Ic.: Rchb., Ic. Fl. Germ. f. 4176.

203 Annual; stem 20—80 cm high, branching; leaves more or less sinuate-dentate to subentire or entire, the lower oblong, obtuse, angustate into a petiole, usually pinnatifid with triangular lobes, the upper lanceolate, acute, sessile, sagittate at base. Sepals ca. 3 mm long; petals ca. 4 mm, oblong; silicles 5—6 mm long and broad, somewhat compressed, more or less tuberculate-rugose, with a small acute conical beak at tip; fruiting pedicels clavately thickened, 4—5.5 mm long. April. (Plate XIII, Figure 11).

Fields, weed-infested places, and crops. — European part: Crim.; Caucasus: Cisc., Dag., E., S., and W. Transc. **Gen. distr.**: Atl. Eur., Med., N. Eur., Bal.-As. Min., Arm.-Kurd., Iran. Described from France. Type in London.

Genus 600. **ISATIS** † L.††

L., Sp. pl. (1753) 670; Gen. (1754) 301.

Sepals equal. Petals short-clawed, yellow or straw-colored. Filaments edenticulate. One annular nectariferous gland at base of shorter stamens, emarginate inside and outside, broadly united with median glands into a closed ring. Ovary sessile. Style very short. Stigma emarginate. Fruit indehiscent, winged silicle, aseptate, bilaterally compressed, with 1 pendulous seed in center of cell; wing varying in size and shape, often well-developed only at fruit-apex. Embryo notorrhizal, rarely pleurorhizal. Hairs simple or absent. — Annual or biennial, sometimes perennial, with fruit pendulous and thin pedicels.

About 60 species, mainly Near Asian and East-Mediterranean. Many species occur also in Central Asia, Siberia, and Europe.

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* From the Greek mys — mouse and agra — snare.

** Treatment by I. T. Vasil'chenko.

† From the Greek isadzo — woad. In ancient times a drug extracted from wood was administered in the treatment of skin diseases.

†† Treatment by N. A. Bush.

1. Leaves all (including cauline) tapering at base, without auricles. Tall
plant, psammophyte. . . . . 15. **I. sabulosa** Stev.
+ Cauline leaves with sagittate base . . . . 2.
2. Silicles with broad wing. . . . . 3.
+ Silicles oblong, wing narrow at apex only . . . . 12.
3. Perennials . . . . 4.
+ Annuals or biennials. Silicles pubescent . . . . 10.
4. Silicle cordate, acute at tip . . . . 6. **I. besseri** Trautv.
+ Silicle orbicular or elliptic . . . . 5.
204 5. Plant densely short-pubescent. Silicles glabrous, orbicular, undulant,
13–18 mm long, 13–16 mm broad. . . . . 5. **I. psilocarpa** Ldb.
+ Plant glabrous or sparsely long-hairy . . . . 6.
6. Stems and leaves rather sparsely long-hairy . . . . 7.
+ Plant glabrous. Silicle broadly elliptic, sometimes narrowly elliptic,
infrequently suborbicular. Wing with few prominent radiating and
divergent nerves . . . . 4. **I. subradiata** Rupr.
7. Silicles glabrous, ancipital. . . . . 3. **I. anceps** N. Busch.
+ Silicles tomentose or glabrous, orbicular, with cordate or orbicular
base . . . . 8.
8. Silicles white-tomentose, the unripe flattened, ovate, tapering into an
obtuse short beak, the ripe with convolute margins (winged),
transversely rugose at the rather convex back, tapering into an erect
lanceolate beak. Wing cordate . . . . 33. **I. boissieriana** Rchb.
+ Silicles when ripe hardly changed . . . . 9.
9. Silicles glabrous or tomentose [sic]. Undershrub of sandy soils, with
obovate leaves [and fruits] . . . . 28. **I. frutescens** Kar. et Kir.
+ Silicles glabrous or tomentose. Perennial with orbicular fruit . . . .
. . . . 2. **I. latisiliqua** Stev.
10. Silicle panduriform, nearly twice as long as broad, broadly truncate-
emarginate at apex. Cell membranous (not spongy), surrounded by a
membranous wing, at both sides nearly as broad as cell . . . .
. . . . 1. **I. emarginata** Kar. et Kir.
+ Silicle oblong or obovate-elliptic . . . . 11.
11. Calyx glabrous; silicle obtuse at both ends, nearly twice as long as
broad. . . . . 30. **I. lasiocarpa** Ldb.
+ Calyx white-villous; silicle oblong . . . . 29. **I. hirtocalyx** Franch.
12. Silicle elliptic or ovate. Plants glabrous or subglabrous. Locule
surrounded regularly by a narrow wing . . . . 13.
+ Silicle oblong-spatulate, cuneate at base. Wing developed only or
mainly at apex. . . . . 16.
13. Silicles very short-tomentose, oblong-linear, carinately curved, with
the broadest part below the middle (where cell lies). Cell somewhat
205 inflated, 1-nerved, sometimes obscurely so . . . .
. . . . 32. **I. trachycarpa** Trautv.
+ Silicle not as above, glabrous or (rarely) villous . . . . 14.
14. Plant glabrous except for calyx and often with villous silicles. Silicle
ovate, surrounded by wing. Cell carinate at both sides . . . .
. . . . 34. **I. apscheronica** N. Busch.
+ Plant completely glabrous. Silicle small, 6–11 mm long, elliptic,
tapering at both ends . . . . 15.

15. Silicle cell 3-lobed, lateral lobes orbicular, the median bluntly 3-ribbed (Caucasus) . . . . 24. **I. brachycarpa** C. A. M.

+ Cell more or less 1-ribbed: the median rib stout and 2-keeled, the lateral ribs obscure (steppes and semideserts of the European part of Siberia and Central Asia). . . . . 31. **I. laevigata** Trautv.

16. Silicle all or at least cell downy . . . . 17.

+ Silicle glabrous, if pubescent then large, to 27 mm long . . . . 26.

17. Silicle reminiscent of the head of Ornithorhynchus paradoxus: with an air-filled vesicle at base, cell scabrous with long white hairs, wing flat, very short-pubescent, spatulate . . . . 37. **I. ornithorhynchus** N. Busch.

+ Silicle not as above. . . . . 18.

18. Cell densely short-pubescent, silicle 1-nerved, very densely white-tomentose . . . . 17. **I. sevangensis** N. Busch.

+ Cell with 3 distinct or blunt ribs or ribless . . . . 19.

19. Glaucous plant with stout tall stem and large inflorescence, upper cauline leaves subauricular, minute. Cell not ribbed, markedly protruding . . . . 11. **I. glauca** Auch.

+ Plant other than above. Cauline leaves distinctly auricled . . . . 20.

20. Cell ribs very distinct . . . . 21.

+ Ribs blunt or obscure or absent . . . . 22.

21. Silicle cuneately tapering at base, broadly winged at apex. Caucasus . . . . 10. **I. araratica** Rupr.

+ Silicle rounded at both ends. Volga area, Siberia, Central Asia . . . . 25. **I. costata** C. A. M. var. **lasiocarpa** (Ldb.) N. Busch.

22. Perennial. Silicle narrow, long, acuminate at apex. . . . . 12. **I. leuconeura** Boiss. var. **trichocarpa** N. Busch.

+ Annuals or biennials 23. 206

23. Low plants to 60 cm high. Silicles winged only at apex, rounded . . . . 24.

+ Tall plants to 80—100 cm high. Silicles oblong-cuneate. . . . . 25.

24. Silicle with scabrous cell, wing short-pubescent . . . 35. **I. iberica** Stev.

+ Silicle wholly very short-pubescent (pubescence seen only under magnification) . . . . 36. **I. minima** Bge.

25. Leaves pubescent (Crimea) . . . . 22. **I. canescens** DC.

+ Leaves glabrous (Caucasus) . . . . 23. **I. grossheimi** N. Busch.

26. Silicles large, about 19—27 mm long . . . . 27.

+ Silicles smaller, about 13—17 mm long . . . . 32.

27. Plant of the alpine zone of the Caucasian Mountains. Flowering racemes reduced even in fruit, sometimes with white hairs on cell or at base of fruit . . . . 9. **I. caucasica** (Rupr.) N. Busch.

+ Plant of much lower altitudes and of plains. Racemes elongated, especially in fruit . . . . 28.

28. Silicle tapering at apex . . . . 29.

+ Silicle truncate or emarginate at apex . . . . 30.

29. Racemes secund in fruit (Central Asia) . . . . . . 12. **I. leuconeura** Boiss.

+ Racemes not secund (Siberia). . . . . 18. **I. oblongata** DC.

30. Silicle with cell markedly protuberant, separated from the wing by a deep lateral groove (Crimea) . . . . 20. **I. litoralis** Stev.

+ Cell not markedly protruding, bluntly ribbed . . . . 31.

31. Plant glabrous, but lower leaves pubescent (Siberia) . . . . 19. **I. jacutensis** N. Busch.

+ Plant glabrous, silicles often tomentose (Transcaucasia) . . . . 23. **I. grossheimi** N. Busch.

32. Wing lateral, stout, spongy, with prominent villous reticulation, at both sides as wide as cell . . . . 8. **I. reticulata** C. A. M.

+ Silicles not as above . . . . 33.

33. Silicles short-acuminate at apex . . . . 34.

+ Silicles truncate or rounded or even emarginate at apex . . . . 35.

207 34. Perennial with multicipital thick rootstock. Plant glaucescent, glabrous, leaves white-ciliate only along margin (Transcaucasia) . . . . 13. **I. arnoldiana** N. Busch.

+ Biennial. Plant glabrous but lower leaves pubescent (Far East) . . . . 17. **I. japonica** Miq.

35. Perennial. Silicle glabrous and narrow with smooth (ribless, nerveless) cell, strongly protuberant . . . . 7. **I. collina** Boiss.

+ Annuals and biennials . . . . 36.

36. Pedicels pubescent. Wing somewhat narrower than the 1-nerved protuberant cell, tomentose when immature. . . . . . 26. **I. bungeana** Seidl.

+ Other than above. Wing wider than cell. 37.

37. Silicle oblong-obovаl, rounded at both ends, cell with longitudinal ribs . . . . 25. **I. costata** C. A. M. var. **leiocarpa** Ldb.

+ Silicle linear or oblong-linear . . . . 38.

38. Silicle linear, 6—7 times as long as broad, cell narrowly linear, divided at both sides by a groove . . . . 27. **I. aleppica** Scop.

+ Silicle oblong-linear, cell obscurely ribbed . . . . 39.

39. Silicle 3—4 times as long as broad. Petals 3—4 mm long . . . . 16. **I. tinctoria** L.

+ Silicle 5 times as long as broad. Petals ca. 2.5 mm long. Flowering racemes short. Crimea, Ciscaucasia . . . . 21. **I. taurica** M. B.

Section 1. **EREMOGLASTON** Bge., Rel. Lehm. (1854) 214; Boiss., Fl. Or. I (1867) 376. — Silicle with membranous cell, encircled by a membranous wing. — Annual with pedicels not thickened.

1. **I. emarginata** Kar. et Kir., Enum. pl. songor. No. 126 in Bull. Soc. Nat. Mosc. XV (1842); Ldb., Fl. Ross. I (1842) 767. — I. violascens Bge., Rel. Lehm. (1854) No. 140, p. 214; Boiss., Fl. Or. I (1867) 376. — Ic.: Bge., l. c., tab. VI, f. A.

Annual, glaucescent; stem slender; leaves oblong-lanceolate, entire, obtuse, glabrous or tomentose, all leaves except the lowest obtusely auriculate. Inflorescence loose, paniculate; pedicels equal to or longer than silicles; silicles densely pilose, panduriform, nearly twice as long as broad, rounded at base, broadly truncate-emarginate at apex, cell membranous (not spongy), encircled by a membranous wing nearly as wide as cell at both sides, suberous-thickened along margin. 208

Salt deserts. — Centr. Asia: Ar.-Casp., Kyz. K., Balkh., Dzu.-Tarb., Kara K. **Gen. distr.:** Iran. Described from Dzungaria, from lakes near the source of the Sasyk-Pastau. Type in Leningrad.

Section 2. **SAMERARIOIDES** Boiss., Fl. Or. I (1867) 377. — Silicle with spongy cell, encircled by a membranous lateral wing.

2. **I. latisiliqua** Stev. in Mem. Soc. Nat. Mosc. III (1812) 267; Ldb., Fl. Ross. I (1842) 210 (part.); Boiss., Fl. Or. I (1867) 377 (part.). — Ic.: Trautv., De Samerar. et Isat. (1841) 342; (1845) 309 (sub I. latisiliqua et I. steveniana).

Perennial; stem 40—60 cm high, stem and leaves rather long and sparsely pilose; leaves entire, the radical oblong-spatulate; upper leaves linear-lanceolate. Sepals 2—2.5 mm long; petals 3.5—4.5 mm long; silicles glabrous (var. gymnocarpa N. Busch) or downy (var. hebecarpa N. Busch), rounded, 15—20 mm long, 13—18 mm broad, rounded at base, emarginate or obtuse at apex; wing much wider than cell. June. (Plate XI, Figure 1).

Taluses and dry rocks. — Caucasus: Greater Caucasus, Dag., E. Transc. (Kuba District). Endemic. Described from Khinalug (Kuba District). Type in Leningrad.

3. **I. anceps** N. Busch in Addenda VII, p. 480.

Perennial; stem 30—40 cm high, sparsely ciliate with long delicate spreading hairs at lower part only; leaves with few obtuse teeth or subentire, covered with long, simple hairs and much shorter branched ones, oblong-spatulate, the upper linear-lanceolate, all leaves amplexicaul at base, auriculate. Inflorescence paniculate; sepals white-pilose, oblong, 2.5 mm long; petals lemon yellow, oboval-oblong, ca. 3.5—4 mm long; fruiting pedicels 10—11 mm long, thin, clavately thickened at tip, divergent or recurved downward; silicle 20—22 mm long, 10—11 mm broad, broadly elliptic, tapering toward both ends (ancipital), yellowish, sometimes undulant, completely glabrous, encircled by a very wide veined wing, cell linear-oblong, with strong longitudinal midrib.

Stony places. — Caucasus: S. Transc. Endemic. Described from the Nakhichevan ASSR, Shakh-Buz District. 2 June 1934 Fl. Fr. Types in Leningrad and Baku.

4. **I. subradiata** Rupr., Fl. Cauc. (1869) 131. — I. latisiliqua var. subradiata N. Busch in Fl. cauc. crit. III, 4 (1908) 243.

Perennial, glabrous; stem 40—60 cm high; leaves entire, radical leaves
209 oblong-spatulate, the upper linear-lanceolate. Sepals 2—2.5 mm long; petals 3.5—4.5 mm long; silicles 12—20 mm long, 11—18 mm broad, broadly elliptic or sometimes narrowly elliptic, infrequently suborbicular, cuneate or rounded at base, obtuse or rarely slightly constricted at apex, downy (var. trichocarpa N. Busch) or glabrous (var. gymnocarpa N. Busch), wing wider than cell, with several (few) prominent divergently radiating straight nerves along wing. April—May.

Dry rocks. — Caucasus: E. and S. Transc. **Gen. distr.:** Arm.-Kurd., Iran. Described from Tbilisi. Type in Leningrad.

5. **I. psilocarpa** Ldb., Fl. Ross. I (1842) 210, 766; N. Busch in Fl. cauc. crit. III, 4 (1908) 244. — I. nummularia Trautv., De Samerar. et Isat. (1841) 342. — Ic.: Trautv., l. c., tab. II, f. 15.

Perennial; stem 30—60 cm high, stem and leaves densely short-pilose; leaves entire, radical leaves oblong-spatulate, upper leaves linear-lanceolate. Sepals ca. 2.5 mm long; petals up to 4 mm long; silicles glabrous, globose, rounded or rarely slightly emarginate at both ends, undulant, encircled by a wide wing, 13—18 mm long, 13—16 mm broad. June. (Plate XI, Figure 2).

Mountain steppes and dry rocks. — Caucasus: E. and S. Transc., Tal. **Gen. distr.:** Iran. Described from Talysh. Type in Leningrad.

6. **I. besseri** Trautv., De Samerar. et Isat. (1841) 342; Ldb., Fl. Ross. I (1842) 766; Boiss., Fl. Or. I (1867) 377; N. Busch in Fl. cauc. crit. III, 4 (1908) 246. — Ic.: Jaub. et Spach. Ill. pl. or. III (1847—1850) tab. 224 (sub. I. platycarpa).

Perennial; stem 40—50 cm high, stem and leaves short-pilose; leaves oblong-spatulate, entire, radical leaves long-petiolate, the upper linear. Petals ca. 6 mm long; fruiting pedicels 10—11 mm long; silicles ovate, distinctly cordate or rounded at base (var. subcordata J. et Sp.), acutish at apex, 21—27 mm long, 14—24 mm broad; lateral wing much wider than cell. May. (Plate XI, Figure 3).

Mountain steppes and dry hills. — Caucasus: S. Transc. (Nakhichevan ASSR). **Gen. distr.:** Iran. Described from N. Iran (Trautvetter erroneously reported "Iberia"). Type in Leningrad.

Section 3. GLASTUM Boiss., Fl. Or. I (1867) 378. — Silicles elliptic, oblong or oblong-cuneate, cell spongy, surrounded by a thick spongy lateral wing.

7. **I. collina** Boiss. in Balansa pl. exs. (1856) sec. Boiss., Fl. Or. I (1867) 379; N. Busch in Fl. cauc. crit. III, 4 (1908) 246. — I. glauca β collina Boiss., Fl. Or. I (1867) 379.

210 Perennial, glaucous; stem thick; leaves entire, radical leaves oblong, the upper subauricular, small. Inflorescence large, paniculate; sepals up to 2.5 mm long; petals up to 4 mm long; silicles glabrous, linear-oblong, cuneate at base, 11—13 mm long, 2—3 mm broad (at the widest part of the wing), obtuse or truncate-emarginate; cell not ribbed, markedly protuberant; wing dilated at summit. June. (Plate XI, Figure 4).

Caucasus: S. Transc. **Gen. distr.:** Bal.-As. Min., Arm.-Kurd. Described from Asia Minor and Turkish Armenia. Type in Geneva.

8. **I. reticulata** C. A. M., Verz. Kolenati (1849) 52; Rupr., Fl. Cauc. (1869) 132; Boiss., Fl. Or. Suppl. (1888) 65; N. Busch in Fl. cauc. crit. III, 4 (1908) 247.

Perennial; stem high; leaves pilose, radical leaves long-petiolate, the middle and upper leaves oblong, sagittate, with rounded auricles. Inflorescence corymbiform; silicles drooping, glabrous, elliptic, obtuse, 15—17 mm long, 7—7.5 mm broad; cell glabrous, flattened, bi-divided by prominent nerve; lateral wing thick, as wide as cell at both sides, spongy, netted with prominent rugose veins. July. (Plate XI, Figure 5).

Caucasus: Greater Caucasus. Endemic. Described from Kazbek. Type in Leningrad.

9. **I. caucasica** (Rupr.) N. Busch in Fl. cauc. crit. III, 4 (1908) 247. — I. alpina var. caucasica Rupr., Fl. Cauc. (1869) 131; Boiss., Fl. Or. Suppl. (1888) 64.

Perennial, completely glabrous; stem 20—60 cm high, crown covered with blackish fibres; leaves glabrous, radical leaves oblong-spatulate, the middle and upper tapering at apex, sagittate, acutely auriculate. Racemes corymbiform, reduced; sepals yellow; petals 4.5—5 mm long, 2.5 mm broad, golden; silicles oblong-cuneate, glabrous or with few white hairs at base or cell white-pilose, 22—23 mm long, ca. 7 mm broad. June—July. (Plate XI, Figure 6).

High-mountain meadows and rocks, 2,300—2,700 m. — Caucasus: Greater Caucasus, Dag. Endemic. Described from North Ossetia, from the town of Kionkhokh. Type in Leningrad.

10. **I. araratica** Rupr., Fl. Cauc. (1869) 132. — I. caucasica var. araratica N. Busch in Fl. cauc. crit. III, 4 (1908) 248. — I. kozlovskyi Grossh., Fl. Kavk. II (1930) 172.

Perennial; stems low, ascending, long-pilose below; radical and lower cauline leaves long-pilose, upper cauline subglabrous, usually ciliate along 211 margins, ovate-lanceolate, acute, with obtuse amplexicaul auricles. Inflorescence few-flowered, corymbiform, later elongating; silicles tomentose, 12—15 mm long, ca. 5 mm broad, elliptic, wing narrow below, wide above, cell rounded, 3-ribbed. (Plate XI, Figure 7).

Rocks. — Caucasus: E. Transc. **Gen. distr.:** Arm.-Kurd. Described from Ararat. Type in Leningrad.

11. **I. glauca** Auch. in Boiss., Ann. Sc. Nat. (1842) 201; Fl. Or. I (1867) 378; Grossg., Fl. Kavk. II (1930) 171.

Perennial, glaucous plant; stem stout, tall; leaves glabrous, entire, radical leaves larger, oblong, upper cauline leaves nearly without auricles, small. Inflorescence large, paniculate; petals golden yellow, 5 mm long; silicles short-tomentose, linear-oblong, cuneate at base, 2—2.5 times as long as broad, obtuse or truncate-emarginate, cell not ribbed, markedly protuberant; wing dilated above. June.

Caucasus: S. Transc. (Nakhichevan ASSR). **Gen. distr.:** Bal.-As. Min., Arm.-Kurd., Iran. Described from northern Iran and Asia Minor. Type in Geneva.

12. **I. leuconeura** Boiss. in Buhse Aufz. d. in Transkaukasien u. Persien gesammelten Pflanzen (1860) 28; Boiss., Fl. Or. I (1867) 379.

Perennial, glabrous or scabrous plant; stem tall, 40—80 cm high, many-branched; radical leaves oblong, tapering into a petiole, cauline leaves oblong-lanceolate, obtusely auriculate. Inflorescence large, paniculate, slender, with long ascending branches; racemes secund in fruit; sepals 3 mm long; petals 5 mm long, straw-colored; fruiting pedicels thickened at apex, 9—12 mm long, recurved downward; silicles narrow, long, 15—21 mm long, 3—6 mm broad, long tapering toward base, somewhat short-acuminate toward apex, short-tomentose (var. velutina N. Busch) or glabrous (var. gymnocarpa N. Busch), cell with prominent 2-ribbed ridge, frequently pale (white), sometimes reddish. June.

Centr. Asia: Ar.-Casp., Kara K., Mtn. Turkm. **Gen. distr.:** Iran. Described from northern Iran. Type in Geneva.

13. **I. arnoldiana** N. Busch in Trav. d. Mus. Bot. d. l'Acad. Sc. URSS XXII (1930) 219. — Ic.: N. Busch, l. c., 220.

Perennial; rootstock stout, woody, multicipital; stems numerous, many-branched, glabrous, glaucescent; radical leaves oblong-spatulate, cauline

212 leaves tapering, becoming smaller at summit, all glaucescent, glabrous, white-ciliate only along margin, not sagittate, hardly auricled. Sepals yellow, 2.5—2.7 mm long; petals 3.5—4 mm long, golden; fruiting pedicels very thin, recurved below, 8—11 mm long; silicles oblong-obcuneate, glabrous, 11—12 mm long, 3—4 mm broad, pendulous.

Stony slopes. — Caucasus: S. Transc. Endemic. Described from Lake Sevan. Type in Leningrad.

14. **I. sevangensis** N. Busch in Trav. Inst. Bot. Ac. Sc. URSS Ser. I, fasc. III (1936) 356. — Ic.: ibidem 359, f. 2.

Biennial, glaucous; stem low, branching, glabrous; radical leaves obovate-oblong (blade 7—12 cm long, 4.5—5 cm broad), gradually tapering into a long (9—10 cm long) petiole; above pilose only along nerves, more densely so beneath, hairs simple and few forked, petioles rather sparsely pilose, hairs spreading or retrorse. Sepals 2.5—2.75 mm long; petals yellow, ca. 5 mm long; fruiting pedicels glabrous or slightly farinaceous, thin, thickening at the tip, 8—15 mm long; silicles densely short-pubescent, ca. 20—22 mm long, ca. 7—8.5 mm broad, oblong, rounded at base, pendulous when ripe, cell 1-nerved, very densely white-tomentose. Fr. July.

Caucasus: S. Transc. Endemic. Described from Armenia, from the banks of Lake Sevan (Ardanysh, Babadzhan-Dara). Type in Leningrad.

15. **I. sabulosa** Stev. ex Ldb., Fl. Ross. I (1842) 212; Trautv., De Samerar. et Isat. (1841) 342; (1845) 316; N. Busch in Fl. cauc. crit. III, 4 (1908) 248. — Ic.: Trautv., l. c., tab. II a, b.

Biennial; stem 40—80 cm high, many-branched; leaves oblanceolate, tapering toward base, without auricles. Racemes few; sepals ca. 3 mm long; petals golden, 4.5—6 mm long; pedicels filiform, recurved downward, 10—12 mm long, slightly thickening toward tip; silicles linear-oblong, 17—23—33 mm long, 6—9 mm broad, tapering toward both ends but more so at base, obtuse at apex, wing rather thin, membranous. June. (Plate XI, Figure 8).

Sands and Transcaspian steppes. — European part: L. V.; Caucasus: Cisc. Endemic. Described from the lower part of the Terek River. Types in Leningrad and Helsingfors.

16. **I. tinctoria** L., Sp. pl. ed. I (1753) 670; DC., Syst. II (1821) 569; Pr. I (1824) 211; Ldb., Fl. Ross. I (1842) 212; Trautv., De Samerar. et Isat. (1841) 342; (1845) 313; Boiss., Fl. Or. I (1867) 380; Shmal'g., Fl. I (1895) 104; N. Busch in Fl. cauc. crit. III, 4 (1908) 248.

213 Biennial; stem 70—80 cm high; radical leaves subacute, oblong-lanceolate, pilose, entire or eroded, middle and upper leaves linear, acute, narrowly sagittate. Inflorescence loose, paniculate; petals 3—4.5 mm long, yellow; silicles glabrous, 3—4 times as long as broad, 13—16 mm long, 3—4 mm broad, oblong-linear, cuneate at base, obtuse or emarginate, cell thin, obscurely ribbed. May—June. (Plate X, Figure 9).

Steppes, dry hills and slopes. — European part: M. Dnp., V.-Don, U. V., Bl., L. Don, Transv., L. V., Crim.; Caucasus: Cisc., Dag., S. Transc.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.:** Med., Bal.-As. Min., Centr. Eur. Described from Europe. Type in London.

Note. The blue and green pigments extracted from the leaves are used for dyeing cloth. A nectar plant.

17. **I. japonica** Miq., Ann. Mus. Lugd. Bat. 2 (1865) 75; Pr. Fl. Japon. (1865) 7; Kom., Fl. Manchzh. II (1903) 356. — I. tinctoria ssp. japonica N. Busch, Fl. Sib. et Or. Extr. I (1913) 159. — Ic.: N. Busch, l. c., 159 et tab. geogr. 160.

Biennial, glabrous; stem erect, tall; lower leaves subacute, oblong-lanceolate, pilose, obscurely dentate, middle and upper leaves linear, acute, narrowly sagittate. Inflorescence loose, paniculate; petals 2.5—3.5 mm long; fruiting pedicels thin, patulous or recurved downward, 4—8.5 mm long; silicles terminating abruptly in a very short point (and not gradually acuminate at apex), 10.5—15.5 mm long, 3.75—4.25 mm broad. June—July.

Rocks, dry slopes, rock streams, and sandy shores of rivers and seas. — Far East: Uda., Uss. **Gen. distr.**: Jap. Described from Japan. Type in Leiden.

18. **I. oblongata** DC., Syst. II (1821) 561; Prodr. I (1824) 211; Turcz., Fl. baic.-dahur. I (1842) 212; Kom., Fl. Manchzh. II, 1 (1903) 356. — I. tinctoria ssp. oblongata N. Busch, Fl. Sib. et Or. Extr. I (1913) 158. — Ic.: N. Busch, l. c., 159 et tab. geogr. 160.

Biennial, glabrous; stem tall, erect; lower leaves acutish, oblong-lanceolate, pilose, entire or emarginate, middle and upper leaves linear, acute, narrowly sagittate. Inflorescence loose, paniculate; petals 2.5—3.5 mm long; fruiting pedicels thin, patulous or recurved downward; silicles gradually tapering at both ends, those above middle much broader, slightly acuminate at tip, 10—20 mm long, 3—4.5 mm broad; cell slightly sulcate, hardly 3-ribbed: lateral ribs obscure, the median distinct.
214 June—August.

Rocks, dry exposed slopes, rock streams, and sandy banks of rivers and Lake Baikal. — E. Siberia: Ang.-Say., Dau. **Gen. distr.**: Mong. Described from Dauria. Type in Geneva.

19. **I. jacutensis** N. Busch comb. nova. — I. tinctoria ssp. jacutensis N. Busch in Fl. Sib. et Or. Extr. I (1913) 159. — Ic.: N. Busch, l. c., 159 et tab. geogr. 160.

Biennial, glabrous; stem erect, tall; lower leaves subacute, oblong-lanceolate, pilose, entire or sinuate, middle and upper leaves linear, acute, narrowly sagittate. Inflorescence loose, paniculate; leaves 2.5—3.5 mm long; fruiting pedicels thin, patulous or recurved downward, 4—8.5 mm long; silicles orbicular, rounded at apex, 14—19 mm long, 4—6 mm broad; cell obscurely almost 3-ribbed. June—July.

Stony and sandy places, rocks, and dry slopes. — E. Siberia: Lena-Kol. Endemic. Described from the Yakut ASSR. Type in Leningrad.

20. **I. litoralis** Stev. in Mém. Soc. Nat. Mosc. III (1812) 267; DC., Syst. II (1821), 568; Prodr. I (1824) 211; Ldb., Fl. Ross. I (1842) 211; Trautv., De Samerar. et Isat. (1841) 342; (1845) 314; N. Busch in Fl. cauc. crit. III, 4 (1908) 250. — Ic.: Delessert, Ic. sel. II, tab. 78; Trautv., l. c., tab. II, f. 184.

Biennial, glaucescent; radical leaves long-petioled, ovate, obtuse, upper leaves broadly sagittate-amplexicaul. Inflorescence loose, paniculate; petals ca. 4 mm long; fruiting pedicels ca. 8 mm long; silicles oblong-cuneate, 15—27 mm long, 7.5—10 mm broad, truncate at apex, sinuate, glabrous or downy, cell rather protuberant, separated at both sides from wing by a deep furrow. April—May. (Plate XI, Figure 13).

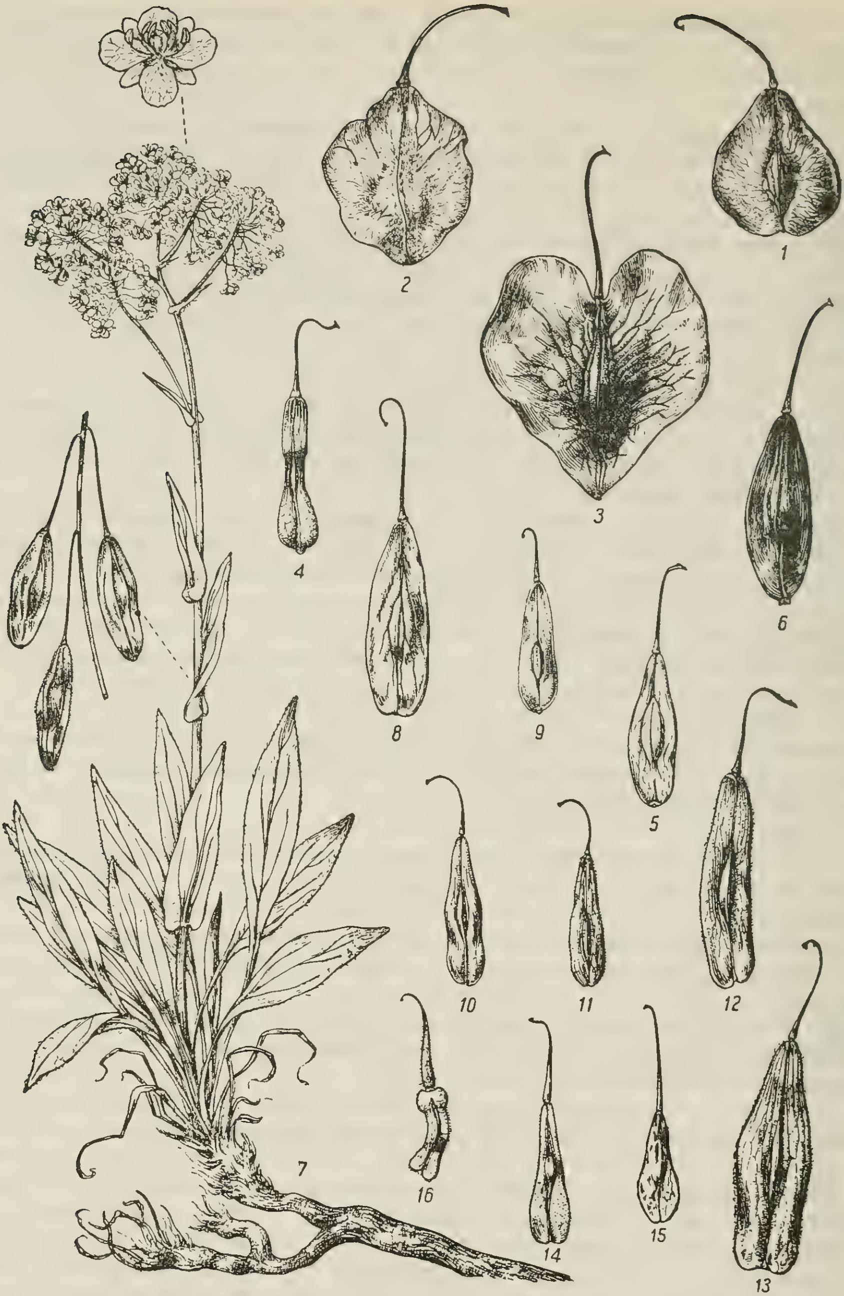

PLATE XI. 1 — Isatis latisiliqua Stev., fruit; 2 — I.psilocarpa Ldb., fruit; 3 — I.besseri Trautv., fruit; 4 — I.collina Boiss., fruit; 5 — I.reticulata C.A.M., fruit; 6 — I.caucasica (Rupr.) N.Busch, fruit; 7 — I.araratica Rupr., habitus, fruit and flower; 8 — I.sabulosa Stev., fruit; 9 — I.tinctoria L., fruit; 10 — I.taurica M.B., fruit; 11 — I.canescens DC., fruit; 12 — I.grossheimi N.Busch, fruit; 13 — I.litoralis Stev., fruit; 14 — I.iberica Stev., fruit; 15 — I.brachycarpa C.A.M., fruit; 16 — I.ornithorhynchus N.Busch, fruit.

European part: Bl., Crim. **Gen. distr.:** Bessarabia. Described from Sudak. Type in Leningrad.

21. **I. taurica** M. B., Fl. taur.-cauc. III (1819) 422; DC., Syst. II (1821) 571; Prodr. I (1824) 211; Ldb., Fl. Ross. I (1842) 212; Trautv., De Samer. et Isat. (1841) 342; (1845) 315; N. Busch in Fl. cauc. crit. III, 4 (1908) 249. — 217 Ic.: Trautv., l. c., tab. II, f. 20 a, b, c.

Biennial; stem 40—60 cm high; radical leaves acutish, oblong-lanceolate, pilose, entire or eroded, middle and upper leaves linear, acute, narrowly sagittate. Inflorescence branching, corymbiform; sepals 1.75 mm long; petals 2.5 mm long; silicles veined, glabrous, linear-oblong, 5 times as long as broad, 13—17 mm long, 3—4 mm broad, obtuse or emarginate at apex, tapering at base. June. (Plate XI, Figure 10).

Steppes, dry hills, and limestone rocks. — European part: M. Dnp., Bl., Crim.; Caucasus: Cisc. (Kuban). Endemic. Described from Bakhchisarai (Crimea). Type in Leningrad.

22. **I. canescens** DC., Fl. de France, Suppl. (1815) 598; Syst. II (1821) 572; Prodr. I (1824) 211; Trautv., De Samerar. et Isat. (1841) 342; (1845) 303; N. Busch in Fl. cauc. crit. III, 4 (1908) 250. — Ic.: Trautv., l. c., tab. I, f. 3a, b.

Biennial; stem 70—80 cm high; radical leaves acutish, oblong-lanceolate, pilose, entire or eroded, middle and upper leaves linear, acute, narrowly sagittate. Inflorescence loose, paniculate; sepals ca. 2.5 mm long; petals ca. 3.5 mm long; silicles downy, 12—22 mm long, 4.5—5.5 mm broad, cuneate at base, oblong-linear, obtuse or emarginate, cell thin, bluntly ribbed. June. (Plate XI, Figure 11).

Dry outcrops.—European part: Crim. **Gen. distr.:** Bal.-As. Min. Described from Med. Type in Geneva.

23. **I. grossheimi** N. Busch in Not. Syst. H. B. Petr. IV, 19—20 (1923) 146. — I. tinctoria var. blepharocarpa Bordz. in Bull. Jard. Bot. Kiew XII—XIII (1931) 120 et in Fedde Repert. XXX (1932) 371, 563. — I. tinctoria ssp. canescens Bordz. in Fedde Repert. XXX (1932) 372, 564.

Biennial; stems glabrous, 80—100 cm high; all leaves cuneate, acutish, glabrous, lower leaves oblong-lanceolate, entire or eroded, upper leaves linear. Inflorescence loose, paniculate; silicles downy, rarely glabrous, cuneate at base, oblong-linear, 17—26 mm long, 5—6 mm broad, obtuse or emarginate at apex; cell thin, bluntly ribbed. June. (Plate XI, Figure 12).

Dry slopes with herbs, 1,200—2,000 m. — Caucasus: S. Transc. Endemic. Described from Armenia, Sukhoi Fontan. Type in Leningrad.

Note. In Transcaucasia, I. grossheimi replaces I. canescens DC. from which it is distinguished by its glabrous stem and leaves, a taller habitus, later flowering, and a habitat at a much higher altitude.

24. **I. brachycarpa** C. A. M. in Eichw., Casp.-cauc. (1831—1833) 17, 31; 218 Ldb., Fl. Ross. (1842) 211; Trautv., De Samerar. et Isat. (1841) 342; (1845) 312; Boiss., Fl. Or. I (1867) 382; N. Busch in Fl. cauc. crit. III, 4 (1908) 251.

Biennial, glabrous; stem 40—80 cm high, branching; radical leaves ovate-oblong, obtuse, short-petiolate, middle and upper leaves entire, lanceolate, acuminate, acutely auricled at base. Inflorescence paniculate;

sepals 2—2.5 mm long; petals 4—4.5 mm long; fruiting pedicels 8—9 mm long; silicles small, 7—10 mm long, 3.5—6 mm broad, elliptic, acuminate at both ends; cell 3-lobed, lateral lobes orbicular, median bluntly tricostate. June. (Plate XI, Figure 15).

Dry hills and slopes, 1,500—1,800 m. — Caucasus: E. and S. Transc. Endemic. Described from Lake Sevan (Armenia). Type in Leningrad.

25. **I. costata** C. A. M. in Ldb., Fl. Alt. III (1831) 204; Ldb., Fl. Ross. I (1842) 211, 766; Kryl., Fl. Alt. I (1901) 113; N. Busch, Fl. Sib. et Or. Extr. I (1913) 160; Kryl., Fl. Zap. Sib. VI (1931) 1284. — Ic.: N. Busch, l. c., 162 (f. leiocarpa Ldb.) et tab. geogr. 163.

Biennial; stem usually glabrous, sometimes sparsely ciliate, erect, up to 120 cm high, branching at upper part; radical leaves oblong, obscurely dentate, tapering into a petiole, scabrous-pilose or sparsely ciliate, cauline leaves lanceolate, sessile, sagittate at base, glaucescent-green, glabrous, entire. Flowering racemes corymbose, elongating in fruit; sepals 1.5—1.75 mm long; petals 2.5—3 mm long, oblong; fruiting pedicels 5—8 mm long, declinate downward; silicles glabrous (var. leiocarpa Ldb.) or densely short-pubescent (var. lasiocarpa (Ldb.) N. Busch), pendulous, obovate-lanceolate, rounded at both ends, 9—14 mm long, 3—5 mm broad, with longitudinal median rib. May—August.

Steppes, dry mountain slopes, and sandy, rocky places. — European part: Transv., L. V.; West Siberia: Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.**: N. Mong., Tarbagatai. Described from Altai. Type in Leningrad.

26. **I. bungeana** Seidl., Botan. Ergebn. (1857) 37, 83; Boiss., Fl. Or. Suppl. (1888) 65; N. Busch in Fl. cauc. crit. III, 4 (1908) 251.

Biennial; stem erect, sparsely pilose; leaves bristly along margins and veins, radical leaves oblong, gradually tapering at base, middle and upper leaves oblong-lanceolate, auricles lanceolate, acute. Inflorescence paniculate; petals 3—3.5 mm long; silicles pendulous, somewhat shorter than the pubescent pedicel, 11—17 mm long, 2.5—6 mm broad, cuneately tapering at base, rounded-emarginate at apex, wing slightly narrower than 219 the protruding 1-nerved cell, tomentose when immature. June—August.

Clayey slopes and mobile taluses. — Caucasus: S. Transc. **Gen. distr.**: Arm.-Kurd. Described from Alagez (Aragats). Type in Tbilisi.

27. **I. aleppica** Scop., Del. Insubr. II (1787) 31; Boiss., Fl. Or. I (1867) 382. — Ic.: Sibth. et Sm., Fl. graec., tab. 615.

Annual, nearly or completely glabrous (var. glabra Litw.); radical leaves obovate, dentate or almost lyrate, cauline and leaves of branches minute, auriculate; silicles covered with retrorse hairs, linear, 6—7 times as long as broad, gradually tapering at base, rounded to truncate-emarginate at apex; cell narrowly linear, separated at both sides by furrow.

Centr. Asia: Mtn. Turkm. **Gen. distr.**: Bal.-As.-Min., E. Med. Described from Aleppo. Type in Innsbruck.

28. **I. frutescens** Kar. et Kir., Enum. (1841) 118; Ldb., Fl. Ross. I (1842) 767; O. et B. Fedtsch., Consp. I (1906) 87; B. Fedchenko, Rast. Turk. 448.

Subshrub; silicles completely glabrous, obovate-elliptic, obtuse at both ends; cell with 3 ridges, lateral ridges somewhat blunt, the median blunt, 2 or 3-ribbed.

Sandy soil. — W. Siberia: Irt. Endemic. Described from pine forests in sands near Semipalatinsk. Type in Leningrad.

29. **I. hirtocalyx** Franchet, Pl. Turkest. Mission Capus (1883) 23, Ann. Sc. Nat. XV (1883) 234.

Annual, completely glabrous plant, glaucescent except for the white-pilose calices; stem low; lower leaves obovate, sinuate or entire, cauline leaves dentate, sagittate-amplexicaul, acutely auriculate. Flowering racemes short; pedicels thin, as long or twice as long as flowers, erect or patent; sepals ovate, villous; petals yellow, twice as long as calyx, oboval, short-clawed; silicles oblong, surrounded by a wing; stigma broad, sessile.

Centr. Asia: Kyz. K. Endemic. Described from "Bukhara." Type in Paris.

Note. Resembles Sameraria but stigma completely sessile. Distinguished from I. minima Bge. by its flowers which are twice as long (6—8 mm long), by much longer (to 15 mm) pedicels and by much broader leaves.

30. **I. lasiocarpa** Ldb., Fl. Ross. I (1842) 211. — I. hebecarpa C. A. M. in Ldb., Fl. Alt. III (1831) 205; Kar. et Kir., Enum. (1841) No. 119, non DC. — I. sibirica Trautv., De Samerar. et Isat. (1841) 342. 220

Biennial; stem tall, stout; leaves oblong-lanceolate, entire, obtuse, radical leaves petiolate, cauline broadly auricled; fruiting pedicels thin, thickening toward apex, 3.5—8 mm long. Inflorescence broad-paniculate; sepals 1.5—2 mm long; petals straw-colored, 2.5—3 mm; silicles obovate-elliptic, rounded at both ends especially above, 8—11 mm long, 4—4.5 mm broad [sic], 7—14 mm long, 3—5 mm broad; nearly 3 times as long as broad, pubescent; cell with 3 ridges: the lateral slightly compressed, obscure, the median prominent, with 2 or 3 small obscure ribs. May—June.

Stony and pebbly slopes, gravels, and sandy riverbanks. — European part: L. V.; W. Siberia: Alt., Irt.; Centr. Asia: Ar.-Casp., Balkh. Described from Altai. Type in Leningrad.

31. **I. laevigata** Trautv., De Samerar. et Isat. in Bull. Acad. St.-Pét. VIII (1841) 342; Ldb., Fl. Ross. I (1842) 766.

Biennial, completely glabrous glaucescent plant; stem tall, stout, radical leaves petiolate, obovate-oblong, the cauline oblong-lanceolate, amplexicaul, auriculate. Inflorescence large, paniculate; sepals 1.25—1.5 mm long; petals yellow, 2—2.5 mm long; silicles glabrous, elliptic, 2—3 times as long as broad, 6—11 mm long, 2.5—5 mm broad, tapering toward both ends, cell almost 3-ribbed: the median rib stout, 2-keeled, the lateral rib obscure. June.

Steppes and semideserts. — European part: L. V.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. Endemic. Described from Siberia. Type in Leningrad.

32. **I. trachycarpa** Trautv. in A. H. P. IX (1886) No. 5858, p. 370.

Annual; stem low, erect, slender, branching, glabrous; leaves glabrous, the radical oblong, tapering into a petiole, obtuse at apex, cauline leaves oblong-lanceolate, amplexicaul, auriculate. Inflorescence small, paniculate; sepals 3—3.5 mm long, straw-colored; petals 5—5.5 mm long, yellow;

pedicels thin, pilose, recurved, shorter than silicles; silicles very short-pubescent, oblong-linear, curved (scaphoid), 12—13 mm long, 2.5 mm broad, broadest beyond midpoint of length (where cell lies), obtuse at apex; cell somewhat inflated, 1-nerved, sometimes obscurely so, wing surrounding on both sides the much broader cell. April.

Clayey semideserts, thickets of Tamarix; also among weeds.— Centr. Asia: Ar.-Casp., Kara K., Kyz. K. Endemic. Described from Kyzyl-Arvat (Turkmenistan). Type in Leningrad.

33. **I. boissieriana** Rchb. fil. in The Journ. of Botany XIV (1876) 46. — I. heterocarpa Rgl. et Schmalh. in A. P. Fedchenko, Putesh. v. Turkestan
221 18 (1882) 11.

Annual, glabrous (except for silicles); stem erect, medium in height; leaves entire, the cauline amplexicaul, oblong-ovate, deeply cordate. Inflorescence loose post anthesis; pedicels filiform, ascending at flowering, twice as long as flower, recurved downward post anthesis, in fruit ca. 14 mm long; sepals 3.5—4 mm long, half as long as petals; petals yellow, cuneate-obovate, 6.5—7 mm long; silicles white-tomentose, the immature flattened, ovate, tapering into an obtuse short beak, at maturity with involute margins, 8.5—16 mm long, 4—8 mm broad, transversely rugose at the rather convex back, tapering into an erect lanceolate beak; wing cordate at base, tapering to the beak at apex; upper silicles with much-developed wing and far less rugose (dimorphism of fruits).

Centr. Asia: Syr D. Endemic. Described from Zeravshan (Chinaz). Type in Leningrad.

34. **I. apscheronica** N. Busch in Trav. d. Mus. Bot. l'Acad. Sc. URSS XXIV (1932) 27. — Ic.: N. Busch, l. c., 28.

Biennial, tall plant, completely glabrous except for calyx and frequently villous silicles; stem erect, many-branched, 40—80 cm high; leaves oblong-ovate, cordate, amplexicaul. Sepals oblong, yellowish, 3—4.5 mm long, 1—1.5 mm broad; petals obovate-oblong, yellowish, 6—6.5 mm long, 2—3 mm broad; median nectariferous glands large, pentagonally stellate with depressed center, lateral glands horseshoe-shaped, 3-lobed, middle lobe larger than lateral; fruiting pedicels very thin, not thickening, recurved, 14—16 mm long; silicle ovate, pendulous, completely villous with simple hairs recurved upward (var. hebecarpa N. Busch) or glabrous (var. gymnocarpa N. Busch), surrounded by a narrow wing, 10 mm long, 6 mm wide, carinate at both sides. May.

Dry places. — Caucasus: E. Transc. (Apsheron); Centr. Asia: Syr D. (Samarkand). Described from Apsheron Peninsula. Type in Leningrad.

Section 3. **APTEROLOBUS** Boiss., Fl. Or. I (1876) 384. — Silicle with spongy cell, winged only at apex, orbicular. — Annuals.

35. **I. iberica** Stev. in Mem. Soc. Nat. Mosc. III (1812) 267; M. B., Fl. taur.-cauc. III (1819) 422; Boiss., Fl. Or. I (1867) 383; N. Busch in Fl. cauc. crit. III, 2 (1908) 252.

Annual, scabrous, 30—60 cm high; leaves large-dentate, radical leaves oblong, the middle and upper sagittate at base; sepals 1—2.5 mm long;

petals 2—4 mm long; fruiting pedicels 5—9 mm long; silicles short-pubescent, 11—20 mm long, 3—4 mm broad at the wide part of wing, cell elongated, 222 straight, thin, gradually tapering toward base, (apical) wing wider than cell, ovate, slightly concave. April—May. (Plate XI, Figure 14).

Rocks and stony slopes. — Caucasus: E. and S. Transc. Gen. distr.: Arm.-Kurd. Described from Tbilisi (Tiflis). Type in Leningrad.

36. **I. minima** Bge., Del. sem. H. Dorp. (1843) p. VII; Boiss., Fl. Or. I (1866) 383. — I. soongorica Schrenk in Bull. phys.-math. d. l'Acad. St.-Pétersb. III (1845) 500. — Ic.: Bge., Reliqu. Lehmann. 215, tab. 4, f. B.

Annual, low, 12—50 cm high, branching from base; leaves glabrous, the radical oblong, obtuse, sinuate or dentate, cauline leaves linear-lanceolate, auriculate at base. Sepals scabrous; fruiting pedicels 6—7 mm long, recurved; silicles 13—14 mm long, linear-tapering at base, very short-pubescent (under magnification); cell slightly curved at end, terminating in a flat truncate-emarginate wider wing 2.5 mm wide at apex. May.

Steppes and deserts. — Centr. Asia: Ar.-Casp., Kara K., Kyz. K., Balkh. **Gen. distr.:** Iran. Described from eastern border of the Kyzyl Kum desert between Kuvan Dar'ya and Yany Dar'ya. Type in Leningrad.

37. **I. ornithorhynchus** N. Busch in Monit. d. Jard. Bot. de Tiflis. Sér. III, 3 (1927) 5. — Ic.: N. Busch, l. c., 6.

Annual, low glaucescent, branching plant; stem completely glabrous, erect; leaves completely glabrous, all sagittate at base, the lower oblong, obtuse, obscurely and remotely dentate with glandulose teeth, upper leaves linear-lanceolate; pedicels gradually but strongly thickening at tip, scabrous with long white hairs; sepals membranous along margin, the median yellowish green, scabrous with long white hairs, 1—1.2 mm long, 0.6—0.7 mm broad; petals white, straw-colored at apex, 1.5—1.7 mm long, 0.5—0.6 mm broad; stamens gradually dilated toward base, the longer 1.2 mm long, the shorter 0.8 mm long; nectariferous glands at both sides of base of shorter stamens, annular, slightly emarginate at both inner and outer sides, united with median glands into a closed ring; fruiting racemes secund; pedicels already post anthesis curved to one side; silicle reminiscent of the head of Ornithorhynchus paradoxus, having at base an air-filled vesicle, cell scabrous with long white hairs; wing apical, flattened, spatulate, very short-pubescent, dilated and truncate at apex; seeds rufous, oblong. May. (Plate XI, Figure 16).

Caucasus: S. Transc. Endemic. Described from Armenia and the Nakhichevan ASSR. Type in Leningrad.

223 Genus 601. CHARTOLOMA * BGE.**

Bge. in Bot. Zeitung 1844, II, 249.

Sepals lanceolate. Petals small, spatulate, with inconspicuous claw, yellow. Filaments of longer stamens thickened at base. Silicle bilaterally flattened, with a dry membranous — as if chartaceous — netted-veined wing along margin and an oblong 1-seeded cell in the middle. Seed pendulous, oblong. Embryo notorrhizal. — Small annuals with entire leaves.

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* From khartes (Greek), charta (Latin), paper and loma (Greek) joint, silicle.

** Treatment by I.T. Vasil'chenko.

Monotypic Central Asian genus.

1. **C. platycarpum** Bge., l. c.; Boiss., Fl. Or. I (1867) 336; Fedch., Rast. Turk. (1915) 448. — Isatis platycarpa Bge., Ind. Sem. h. Dorpat. (1843). — Exs.: Bge., Alex. Lehm. reliq. bot. No. 87.

Annual; stem 10—15 cm high; plant green with a yellowish tinge, sometimes irregularly dingy purple (especially at lower part), or glaucescent; stem erect, simple or slightly branching; leaves sinuate-dentate, acute, lower leaves oblong, soon withering, upper leaves oblong-ovate, obtusely auriculate at base, amplexicaul, the uppermost leaves small, entire, ciliate at tip. Racemes apical and axillary; sepals ca. 2 mm long, narrowly lanceolate, pubescent with simple more or less spreading caducous whitish hairs; petals yellow, linear, dilated above, longer than sepals; silicles 15—20 mm long, 10—15 mm broad, flattened, on nodding pedicels, with a dry membranous chartaceous netted-veined wing along margin and an oblong 1-seeded cell in the middle; cell with a longitudinal thin midrib; wing ca. 5 mm wide, truncate or slightly emarginate at both ends, with a small thickened rib in the middle curved parallel to margin and a thinner marginal nerve. April. (Plate XIII, Figure 9).

Sandy deserts. — Centr. Asia: Kara K., Kyz. K. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

Genus 602. **PACHYPTERYGIUM** * BGE.**

Bunge in Del.sem.h.Dorp.(1843) VIII. — Pachypteris Kar.et Kir., Bull.Soc.Nat.Moscou (1842) 158 (non Brongn., Hist.veg.foss.I, 1828, p.168).

Sepals spreading, not saccate. Petals small, oblong, yellow. Filaments 224 edenticulate; annular nectariferous gland around base of shorter stamens united with median glands into a closed ring. Ovary sessile. Silicle compressed, elliptic or oblong, depressed along cell, cylindrically thickened along margin, up to 5—7 mm long. Stigma sessile. Cells monospermous. Seed flattened, pendulous. Embryo notorrhizal, cotyledons flat. — Annuals; glabrous, pubescent only along silicles. Radical leaves oblong, the cauline sessile, cordate, or hastate at base.

1. Silicles with thickened wings ending above cell in a short beak . . . . 1. **P. brevipes** Bge.
+ Silicles with thickened wings surrounding cell but not forming a beak . . . . 2.
2. Inflorescence dense . . . . 3. **P. densiflorum** Bge.
+ Inflorescence loose . . . . 2. **P. multicaule** (Kar. et Kir.) Bge.

Section 1. ARCHIPACHYPTERYGIUM Jarm. — Thickened wings of silicle prolonged above cell into a short beak.

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* From the Greek pachys — thick and pterygion — wing.

** Treatment by A.V.Yarmolenko, revised by the editor.

1. **P. brevipes** Bge., Del. sem. h. Dorpat. (1843) VIII; Linnaea XVIII (1844) 156; Boiss., Fl. Or. I, 274. — P. heterotrichum Bge. in Boiss., l. c. — Ic.: Bge. in Arb. Nat. Ver. Riga I, 1848, tab. 7 c; Popov, Opred. r. okr. Tashk. 2 (1924) ill. 200.

Stems 15—30 cm high, erect or ascending; cauline leaves cordate, amplexicaul at base, the uppermost sometimes tapering toward base. Inflorescence diffuse; silicles 4—5 mm long, on short (3—4 mm long) pedicels, oblong-pyriform, with glabrous or pubescent wings convergent and prolonged above cell into a short beak; stigma hardly visible, emarginate. April—June. (Plate XII, Figures 1, 1 a).

Stony slopes and ravines. — Centr. Asia: Kara K. (introduced into Repetek), Mtn. Turkm., Amu D., Syr. D., Pam.-Al., T. Sh. (western). **Gen. distr.:** Iran. Described from Zeravshan. Type in Leningrad.

Note. The variability of this species is most pronounced in the pubescence of the silicles. On the basis of this character Bunge separated P. heterotrichum (l. c.); however, the ranges of the glabrous and pubescent silicle forms obviously overlap each other and collections of both from the same locality have shown the absence of ecological isolation.

227 Section 2. **EUPACHYPTERYGIUM** Jarm. — Thickened wings of silicle converging above cell, not ending in a beak.

2. **P. multicaule** (Kar. et Kir.) Bge., Del. sem. h. Dorpat. (1843) VIII; Linnaea XVIII (1844) 155. — Pachypteris multicaulis Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 159; Ldb., Fl. Ross. I, 767. — Pachypterygium lamprocarpum Bge., l. c.; Boiss., Fl. Or. I, 374. — P. ramosum Jarm. ex Pavlov, Fl. Tsentr. Kazakst. II (1935) 276. — Ic.: in Arch. Nat. Ver. Riga I (1848) tab. 7 f. A—B. — Exs.: Kar. et Kir., Hb. exs. Soc. Nat. Mosq., No. 1247. — H. F. A. M. No. 84.

Perennial; stems 10—25 cm high, strict, branching; cauline leaves sessile: the lower, oblong, sagittate at base; the uppermost sublinear, tapering toward base. Inflorescence diffuse, many-flowered; fruiting pedicels 1.5 to 2.5 times as long as mature fruit; silicles 3.5—4.5 (5) mm long, oblong-elliptic, glabrous or pubescent; style barely visible; stigma inconspicuous. April—June. (Plate XII, Figure 3).

Saline soils, loess terraces, Tamarix and saxaul thickets, wormwood, semideserts, and mountains up to 2,000 m. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Amu D., T. Sh., Pam.-Al. Endemic. Described from the Lake Balkhash area. Type in Leningrad.

Note. With respect to silique-pubescence, type of growth, and ecology, this species shows a series of forms, partly described as P. lamprocarpum and P. ramosum and partly not yet described. The occurrence of transitional forms and certain characters of outbreeding indicate that the whole series of forms should be considered as one species, until more material is collected.

Editor's note. P. praemontanum, separated by Yarmolenko, is not distinguished (as a species) from P. multicaule (Kar. et Kir.) Bge.

3. **P. densiflorum** Bge. in Boiss., Fl. Or. I (1867) 373.

Perennial; stem 10—20 cm, mostly branching; cauline leaves oblong to oblong-linear, sagittate at base, shortly and acutely auricled or sessile,

(225)

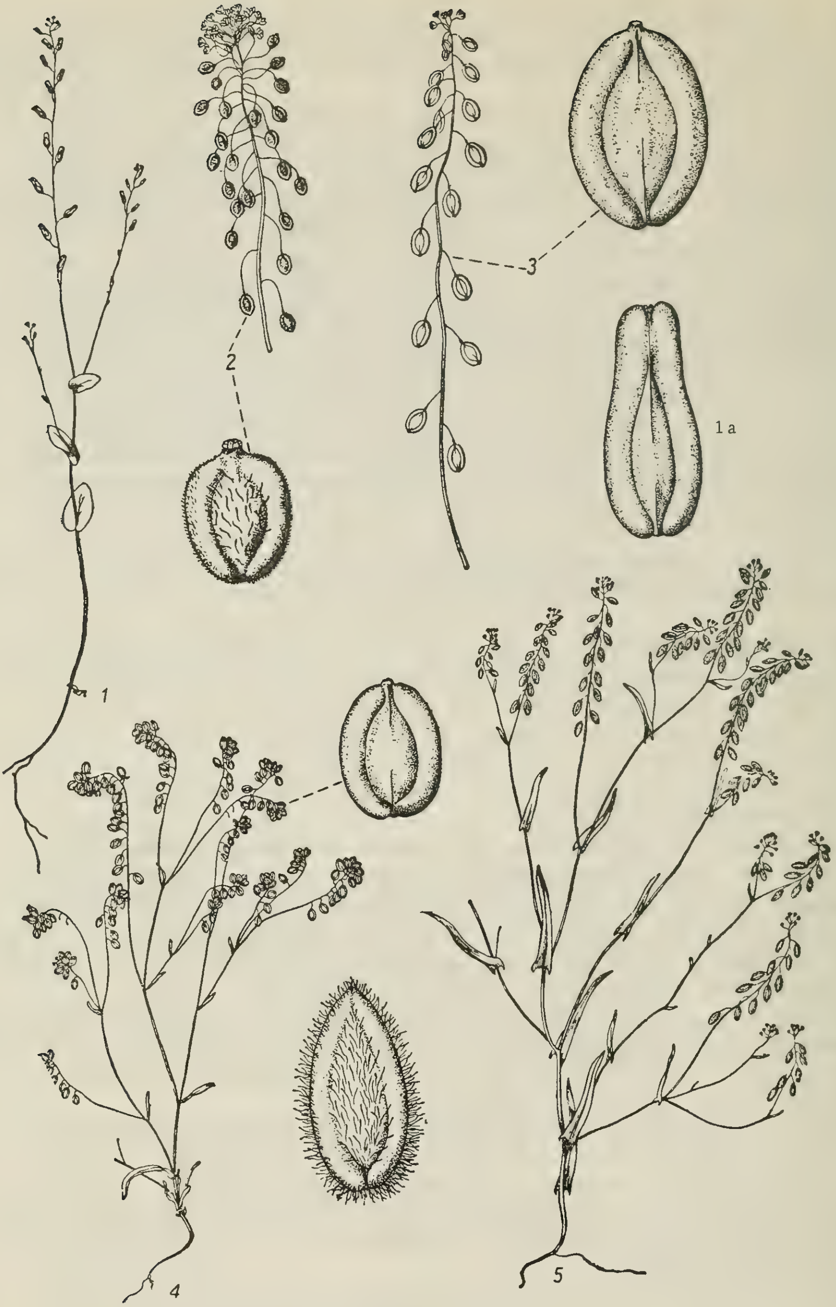

PLATE XII. 1–1a – Pachypterygium brevipes Bge. and fruit; 2 and 3 – P. multicaule (Kar. et Kir.) Bge. and fruit; 4 and 5 – P. densiflorum Bge. and fruit.

tapering. Racemes dense; pedicels as long as or shorter or slightly longer than silicles; silicles glabrous or diversely pubescent, 2.5—3 mm long, orbicular or more often orbicular-elliptic; stigma inconspicuous. April—June. (Plate XII, Figures 4 and 5).

Stony mountain slopes and (variegated) gypsiferous strata. — Centr. Asia: T. Sh., Pam.-Al. **Gen. distr.:** Iran. Described from localities between Kabbise and Kerman. Type in Geneva.

Note. This is the most specialized taxon, quite unique in habitat. A taxon close to P. densiflorum in appearance is P. multicaule, encountered in the Balkhash area; it differs from the latter by its habitat 228 (on gravels) and the elliptic shape of the silicles.

Editor's note. P. echinatum, separated by Yarmolenko, does not differ significantly from P. densiflorum Bge.

Genus 603. **TAUSCHERIA*** FISCH.**

Fisch. in Catal. h. Gorenk. (1812) 49 et in DC., Syst. II (1821) 563.

Sepals divergent. Petals yellow, often subsequently albescent. Filaments free, edenticulate. A short-cylindrical arcuate nectariferous gland at both sides of shorter stamens and 1 median gland united with lateral outside longer stamens. Ovary on very short gynophore. Style short, conical, stigma small. Fruit indehiscent, ovate, scaphoid, convex below, with a coriaceous incurved wing at upper margin, prolonged at apex into a beak, obtusely crenate along margin, transversely rugose, monospermous. Seed pendulous at apex of fruit. Cotyledons flat, embryo notorrhizal. — Glabrous, gray-blue annuals with sessile, cordate, lanceolate, amplexicaul cauline leaves.

Note. Fischer (l. c.) distinguished two species within the range of this genus: one with pubescent silicles (T. lasiocarpa), the other with glabrous silicles (T. gymnocarpa). Most of the authors after Fischer regarded the plant with glabrous silicles as a variety of T. lasiocarpa. The two varieties (species) were in many cases joined together under one name (T. desertorum Ldb.). Fruit pubescence in T. cannot be accepted as a diagnostic criterion for species delimitation. Plants with glabrous and pubescent fruits are found in all species of this genus and clearly represent local ecological races. Our determination of species in the genus Tauscheria was based on morphological traits and size of fruit.

1. Fruit ovate with erect beak, 7—10 mm long (with beak). . 2. **T. oblonga** Vass.
+ Fruit hemispherical, 3—4 (5) mm in size, beak usually curved . . . . 1. **T. lasiocarpa** Fisch.

1. **T. lasiocarpa** Fisch. in DC., Syst. II (1821) 563; Kryl., Fl. Zap. Sib. VI (1931) 1286. — T. desertorum Ldb., Ic. Fl. Ross. II (1830) 139. — T. gymnocarpa Fisch., ibid.; Boiss., Fl. Or. I (1867) 372; N. Busch, Fl. Sib. et Or. Extr. I (1913) 154. — Ic.: Ldb., l. c.; N. Busch, Fl. Sib. et Or. Extr. I (1913) 154 et tab. geogr. 155.

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* After Tauscher, who collected living material and seeds for the Botanical Garden in Gorenki (Inder Lake, 1806, Sarepta 1819).

** Treatment by I. T. Vasil'chenko.

229 Annual, 20—30 cm high, branching above; radical leaves short-petiolate, obtuse, lower cauline leaves cuneately tapering toward base, acutish, the rest cordate-amplexicaul at base, acuminate. Silicles ascending from recurved pedicels, 3—4 mm long, 2.5—3.5 (4) mm broad, with an oblique beak at tip 1.5—2 mm long, more or less hemispherical in shape, the inner cavity bordered by an involute wing, cell occupying large part or nearly all (up to margin) of the silicle. April—June. (Plate XIII, Figures 12 and 13).

Steppes, slopes. — European part: L. V.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., T. Sh., Pam.-Al., Mtn. Turkm. Gen. distr.: Mong., Dzu.-Kash. Described from the Lower Volga. Type in Geneva.

Note. A small-fruited variety of T. lasiocarpa (silicles ca. 2 mm long, with 1 mm long beak), which I named var. microcarpa Vass., is distributed in the mountainous areas and the north of Central Asia.

2. **T. oblonga** Vass. sp. nova in Addenda VII, p. 480.

Annual, large, 30—40 cm high, branching above. Silicles long-ovate, nodding, numerous, crowded, 7—8 mm long (with beak), 3.5—4 mm broad, tapering gradually at tip into a broad and long erect beak sometimes nearly as long as silicle; wing slightly involute along margin, inner cavity broad and open with valve slightly convex, with a small prominent and thickened rib at middle. March. (Plate XIII, Figures 14 and 15).

Fields and slopes of foothills. — Centr. Asia: T. Sh., Syr D., Pam.-Al., Amu D., Mtn. Turkm. Gen. distr.: Dzu.-Kash. Described from the environs of Samarkand, where it was collected in the hills. Type in Leningrad.

Note. The plants, collected by Minkvits, 28 April 1914, in the vicinity of Saryagach near Tashkent, should obviously be referred to this species; these plants, which (tentatively, in view of lack of material) I consider a variety of T. oblonga (var. macrocarpa Vass.), are distinguished by large fruits (8—10 mm long, ca. 6 mm broad).

Genus 604. **SAMERARIA** * DESV.**

Desv., Journ.Bot.III (1813) 161.

Sepals divergent, not saccate. Petals 5—7 mm, oblong, wider at apex, 230 pale yellow. Filaments edentate. An annular nectariferous gland at base of shorter stamens, open outside, broadly united with the median glands to form a closed ring. Ovary sessile. Style conspicuous, stigma small, somewhat 2-lobed. Fruit indehiscent, ovate or rounded, flatly compressed, surrounded by wide coriaceous wing, thick-walled in the middle, keeled along sutures, monospermous, nodding from recurved pedicel. Cotyledons flat. Embryo notorrhizal. — Glabrous, gray-blue annuals with oblong radical leaves and oblong-ovate, cordate, amplexicaul cauline leaves.

A Near and Central Asian genus.

1. Silicles with 2 pairs of wings (Sect. Tetrapterygium (Fisch. et Mey.) Boiss.) . . . . 2.
+ Silicles with 2 lateral wings (Sect. Eusameraria Boiss.) . . . . 3.

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* From the Latin samara — key fruit.

** Treatment by N.A.Bush and I.T.Vasil'chenko.

2. Silicles with spongy cell-wall . . . . 2. **S. sclerocarpa** Bordz.
+ Silicle cell coriaceous . . . . 1. **S. glastifolia** (F. et M.) Boiss.
3. Silicles 15–20 mm in size . . . . 4.
+ Silicles (10) 12–(14) mm in size . . . . 6.
4. Cell with a longitudinal groove in middle . . . . . 8. **S. canaliculata** Vass.
+ Cell with a prominent ridge or tooth or nerve in middle . . . . 5.
5. Cell with ridge or tooth, silicle cordate at base . . . . 5. **S. cardiocarpa** Trautv.
+ Cell only with nerve, silicle not cordate at base . . . . 6. **S. litvinovi** N. Busch.
6. Silicles orbicular-ovate . . . . 7.
+ Silicles oblong-ovate to slightly ovate . . . . 8.
7. Fruit glabrous, with keel along cell, cell ovate-spheroid . . . . 4. **S. deserti** N. Busch.
+ Fruit pubescent, rarely glabrous, without keel, cell globose . . . . 3. **S. armena** (L.) Desv.
8. Silicle with acute nerves on surface forming cavities and a small longitudinal rib broadening (to 0.5–0.75 mm) and prominent on cell . . . . 10. **S. bullata** (Ait. et Hemsl.) B. Fedtsch.
+ No prominent acute nerves and cavities on surface of silicle. Longitudinal rib small and thin, smooth, slightly protuberant . . . . 9.
231 9. Silicles delicate, as though chartaceous, somewhat netted . . . . 7. **S. turcomanica** (Korsh.) B. Fedtsch.
+ Silicles coarse, tomentose, radially large-pitted along wing . . . . 9. **S. aitchisoni** (Korsh.) B. Fedtsch.

Section 1. TETRAPTERYGIUM (Fisch. et Mey.) Boiss., Fl. Or. I (1867) 375. — Silicle with 2 pairs of wings (4 in all).

1. **S. glastifolia** (Fisch. et Mey.) Boiss., Fl. Or. I (1867) 375; N. Busch, Fl. cauc. crit. III, 4 (1908) 238. — Tetrapterygium glastifolium Fisch. et Mey. Ind. Sem. Hort. Petrop. I (1835) 39; Ldb., Fl. Ross. I (1842) 210.

Annual; stem 20–40 cm high, slender, branching from base; lower leaves oblong, the rest ovate-lanceolate, sessile, deeply cordate; all leaves more or less sinuate-dentate to entire. Silicles rounded, up to 15–20 mm long (sometimes 10–12 mm in size – f. microcarpa N. Busch), deeply cordate at base, slightly emarginate at apex with a small (ca. 1 mm) beak in the incision; lateral wings up to 7–8 mm wide, the dorsal and ventral ca. 3–4 mm wide; pedicels much shorter than silicles, recurved, 6–8 mm long. April–May. (Plate XII, Figure 1).

Dry hills, solonetzic clayey soils. — Caucasus: S. Transc. Endemic. Described from the environs of Nakhichevan. Type in Leningrad.

2. **S. sclerocarpa** Bordz. in Visn. Kyivsk. Bot. Sadu VII–VIII (1928) 16 cum icone fructus.

Annual; inflorescence glabrous except for the slightly pubescent axis, glaucous; stem branching from base; leaves obtuse, the radical obovate or oblong, petiolate, entire or dentate, cauline leaves oblong, cordate, amplexicaul. Sepals oblong-elliptic or elongate-ovate, obtuse, 3.5–4 mm long; petals yellow, oblong-spatulate, short-clawed, 6.5–7.5 mm long;

fruiting pedicels recurved, 8—9 mm long; silicles broadly ovate or ovate-orbicular, glabrous, deeply cordate at base, emarginate at apex, (12)—14—15 mm long, 13—15 mm broad, style exceeding incision, cell-wall rather thick, spongy, indurate, wings coriaceous, the lateral as long as width of cell, the dorsal and ventral narrow. April.

Dry hills. — Caucasus: S. Transc. Endemic. Described from the Nakhichevan ASSR near the village of Negram. Type in Kiev. A rather doubtful species.

Section 2. **EUSAMERARIA** Boiss., Fl. Or. I (1867) 375. — Silicle with 2 lateral wings.

232 3. **S. armena** (L.) Desv., Journ. bot. III (1814) 161; Boiss., Fl. Or. I (1867) 375; N. Busch, Fl. cauc. crit. III, 4 (1908) 237. — Isatis armena L., Sp. pl. (1753) 670, DC., Syst. II (1821) 566; Ldb., Fl. Ross. I (1842) 210. — Ic.: Trautv., Samer. et Isat. tab. I, f. 1.

Annual, delicate, with slender branches, 20—30 (40) cm high, usually branching from base. Silicles orbicular-ovate, (10) 12 (14) mm long, (8) 10—12 mm broad, cordate at base, with small beak at apex; wing densely short-pubescent, radially veined, ca. 3 mm wide; cell inflated, subglobose, orbicular in cross section, with solid walls (often bluish at the cross section), to 0.8—1 mm thick, densely tomentose, sometimes silicles glabrous (f. leiocarpa N. Busch); the longitudinal rib on cell thin and small, when evanescent with a groove instead. June. (Plate XIII, Figure 8).

Dry slopes. — Caucasus: S. and E. Transc. **Gen. distr.:** Arm.-Kurd., Iran. Described from environs of Nakhichevan. Type in London.

4. **S. deserti** N. Busch sp. nova in Addenda VII, p. 479.

Annual, low, glabrous except for calyx and pedicels, branching from base; leaves entire, oblong, cauline leaves cordate-amplexicaul at base. Pedicels and sepals sparsely covered with simple hairs; sepals oblong, ca. 3 mm long; petals yellow, 4—4.5 mm long; fruiting pedicels very thin, recurved, 8—9 mm long; silicles completely glabrous, orbicular-ovate, ca. 12 mm long, ca. 10 mm broad, cell inflated, with a low keel, wing distinctly radially veined, ca. 3 mm wide, style 0.5 mm long. April—May.

Grassless slopes. — Centr. Asia: Balkh. Endemic. Described from western Bet-Pak-Dala, Kenderlyk Well side gully, red clay slopes. Types in Tashkent and Leningrad.

Note. Distinguished from S. armena by its glabrous fruit and keeled cell.

5. **S. cardiocarpa** Trautv., A. H. P. I (1871) 31; Boiss., Fl. Or. Suppl. 63.

Annual, 30—40 cm high, coarse, mostly branching from base. Silicles rounded, ca. 20 mm in size, twice as long as pedicels, ca. 16—18 mm broad, deeply cordate at base, narrowly emarginate at apex, with persistent style in the incision much shorter than incision, wings 5—7 mm broad, sparsely pilose, radially rugose-plicate, veined, cell tomentose-downy, with longitudinal prominent crest or tooth in middle. April—May. (Plate XIII, Figure 5).

233 Steppes, clayey slopes, ravines, shores. — Caucasus: Dag.; Centr. Asia: Ar.-Casp. Endemic. Description based on Bekker's material from Kum-Torkali in Dagestan. Type in Leningrad.

★6. **S. litvinovii** N. Busch sp. nova in Addenda VII, p. 479.

Annual; stem 60—70 cm high, divaricately branching, pubescent; leaves pubescent. Racemes long, loose; sepals glabrous or almost completely glabrous, oblong, 2.5—3 mm long; petals yellow, narrowly spatulate, clawed, rounded at apex, 5—5.5 mm long; fruiting pedicels 13—25 mm long, very thin, horizontal or recurved, pubescent; silicles orbicular, broader across, 13—16 mm long, 18—20 mm broad, pubescent, cell tomentose, grooveless, with longitudinal midrib. May—June.

Pebbly slopes. — **Gen. distr.:** Arm.-Kurd. Description based on D. I. Litvinov's specimen from former Kars Province, ravine near Promezhutochnaya railroad station.

Note. Described in case it should be found within the USSR.

7. **S. turcomanica** (Korsh.) B. Fedtsch., Rast. Turk. (1915) 446. — Isatis turcomanica Korsh. in Mém. Acad. Pétersb. VIII Sér., IV (1896) 89 (part.).

Biennial; stem glabrous, divaricately branching, 20—30—50 cm high; leaves glaucous, the upper ovate or ovate-oblong, deeply cordate, amplexicaul, with obtuse auricles. Inflorescence paniculate, racemes long; sepals 4—5 mm long, pubescent, rarely glabrous; petals yellow, 7—8 mm long; pedicels thin, 9—14 mm long in fruit, recurved; silicles pendulous, orbicular-oval, delicate, somewhat chartaceous, 12—17 mm long, 10—12 mm broad, slightly cordate at base, tapering toward apex, obtuse, glabrous (var. typica Korsh.) or densely pubescent (var. lasiocarpa Korsh.), with a strong longitudinal nerve and small slightly prominent thin radial veins; style very short; cell convex, elliptic, narrow, 2—3 mm broad, the mature (and to a lesser extent the whole silicle) often darkly smoke-colored, with membranous walls; wing around silicle membranous, thin, suberous-thickened only along margin. April. (Plate XIII, Figures 2 and 4).

Sandy deserts. — Centr. Asia: Kara-Kum, Mtn. Turkm. Endemic. Described from desert near Karry-Bent railroad station and from the Tedzhen (Hari Rud) River. Type in Leningrad.

234 8. **S. canaliculata** Vass. sp. nova in Addenda VII, p. 479.

Biennial, 15—30 cm high, branching from base with coarse branches. Silicles 15 (18) mm in size, orbicular, cordate at base, slightly emarginate at apex, with curved short style, widely membranous along margin, wings ca. 5 mm wide, radially rugose-plicate, short-pubescent, veins thin; cell ca. 10 mm long, ca. 8 mm broad, robust, coarse, bisected by a longitudinal groove, densely pubescent. May. (Plate XIII, Figure 6).

Steppes. — Centr. Asia: Ar.-Casp. Endemic. Description based on I. M. Krasheninnikov's specimen from Turgai District. Type in Leningrad.

Note. The groove on the fruit cell is clearly marked in mature silicles; in unripe silicles it is frequently undeveloped, but the squarrose pubescence is already visible in the young fruit.

9. **S. aitchisonii** (Korsh.) B. Fedtsch., Rast. Turk. (1915) 447. — Isatis aitchisoni Korsh. in Mém. Ac. Sc. Pétersb. VIII Sér., t. IV (1896) 90.

Annual, completely glabrous except for flowers and fruit; stem simple, often spreadingly branched above; upper leaves ovate, ovate-lanceolate or oblong, deeply cordate, amplexicaul. Inflorescence paniculate; fruiting pedicels arcuate; sepals oblong, sparsely covered with long hairs, ca. 4 mm long; petals yellow, oboval, truncate or emarginate at apex, tapering gradually into a wide claw; silicles densely hairy, ovate, sometimes slightly cordate at base, 12–16 mm long, 8–12 mm broad, acute or slightly acuminate, rarely obtuse, with a rather broad but very short style, barely 0.5 mm long, cell convex, thick-walled, with obtuse keel on both sides; wing radially large-pitted. May–June. (Plate XIII, Figure 3).

Dry sandy mountain slopes. — Centr. Asia: Mtn. Turkm. Endemic. Described from the environs of Akar-Cheshme and Akrabad. Type in Leningrad.

Note. Close to S. bullata. S. bullata is distinguished by the glabrous fruit and the thin-walled cell with markedly prominent keel; the venation of S. bullata is more distinct owing to the glabrous silicle.

10. **S. bullata** (Aitch. et Hemsl.) B. Fedtsch., Rast. Turk. (1915) 447. — Isatis bullata Aitch. et Hemsl., The Botany Afgh. delimit. Commission in Trans. of the Linn. Soc. Ser. V, III Botany (1888) 37.

Annual, glabrous; stem simple at base, 30–40 cm high, branching; leaves thick, cauline leaves sessile, amplexicaul, oblong, rounded at apex, sinuate, with very obtuse auricles. Inflorescence branching, loose; pedicels filiform, 235 strongly curved in fruit; flowers yellow; silicles indurate, ovate, glabrous, tapering at tip, 15–18 mm long, 9–10 mm broad, with very short obtuse style, wing surrounding silicle, rounded at base, cell alveolate, with few prominent nerves, flattened between nerves, midrib protruding and thickened, 0.5–0.75 mm long. April–May. (Plate XIII, Figure 7).

Centr. Asia: Kara-Kum, Mtn. Turkm. (Badkhyz). **Gen. distr.:** Iran., Afghanistan. Described from Afghanistan. Type in London.

Genus 605. **BUNIAS** * L.**

L., Sp.pl.ed.I (1753) 669; Gen.ed.5 (1754) 300.

Sepals erect or divergent, slightly saccate. Petals yellow or white. Filaments free, edenticulate. Short annular nectariferous gland at base of shorter stamens, 3-lobed outside, broadly united with the median glands into a closed ring. Ovary sessile, style conical, stigma shortly 2-lobed. Fruit an ovoid nut-shaped indehiscent silicle with 2 monospermous cells, one on top of the other. Septum indurate. Cotyledons spirally convolute, embryo notorrhizal. Hairs branched. Biennials or perennials, branching, with lyrate, pinnately lobed or sinuate-dentate leaves.

1. Flowers yellow, silicles large, tuberculate . . . . 1. **B. orientalis** L.
+ Flowers white, silicles smooth . . . . 2. **B. cochlearioides** Murr.

1. **B. orientalis** L., l. c.; DC., Syst. II (1821) 672 et Prodr. I (1824) 230; Ldb., Fl. Ross. I (1842) 226; Boiss., Fl. Or. I (1867) 409; Shmal'g., Fl. I, 102; N. Busch, Fl. cauc. crit. III, 4 (1910) 679; Fl. Sib. et Or. Extr. VI (1931) 616; Kryl., Fl. Zap. Sib. VI (1931) 1385; — Ic.: N. Busch, Fl. Sib. et Or. Extr. VI (1931) 617 et tab. geogr. 618; Rchb., Ic. Fl. Germ. tab. 1, f. 4162 (sub. Laelia orientalis). — Exs.: A. Bge., Al. Lehm. rel. bot. No. 158.

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* From the Greek bounos — hill; very probably due to the character of the habitat (often dry hills).

** Treatment by I.T. Vasil'chenko.

Biennial, 40—80 (120) cm high; stem coarse, erect, branching at upper half, beset with short spreading hairs below and black prominent warts; leaves lanceolate, covered with short branching hairs and dark warts, radical leaves long-petioled, lyrate, pinnatipartite, with lanceolate acute retrorse lateral lobes and a large triangular terminal one, hastate at base, 236 sinuate-dentate along margin; cauline leaves more or less sinuate-dentate along margin, with somewhat larger teeth at base. Flowers bright yellow; sepals lanceolate, spreading at flowering, ca. 3 mm long; petals oboval, twice as long as sepals; silicles irregularly ovate, oblique, longitudinally rugose-tuberculate, declinate to side of short beak, often transversely contracted, 6—8 mm long, 3—4 (5) mm broad; fruiting pedicels 15—20 mm long, ascending. June. (Plate XX, Figure 9).

Fields, meadows, and as weeds. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., V.-Kama, U. Dnp., U. V., V.-Don, Transv., M. Dnp., Bl., L. Don, Crim.; Caucasus: Ciscaucasia, W., E., and S. Transc.; W. Siberia: U. Tob., Irt. **Gen. distr.:** Atl. Eur., Scand. (southern part), Centr. Eur., Bal.-As. Min., Arm.-Kurd. Described from Russia ("Hab. in Russia"). Type in London.

Note. Cooked leaves are eaten in Armenia; in Transcaucasia the young preflowering stems are also eaten. In the former Chechen-Ingush ASSR the roots, which have antiscorbutic properties, are eaten.

2. **B. cochlearioides** Murr. in Comment. Goetting. VIII (1777) 42; Ldb., Fl. Ross. I (1842) 226; Shmal'g., Fl. I, 103; N. Busch, Fl. Sib. et Or. Extr. (1931) 618. — Ic.: N. Busch, l. c., 619 et tab. geogr. 618.

Biennial, with many erect branching stems (rarely stem solitary), 15—20 (30) cm high, glabrous or sparsely pilose; leaves oblong, coarsely sinuate-dentate to sublyrate and pinnatipartite, radical leaves rather long-petioled, cauline leaves sessile, oblong or lanceolate, with small semi-amplexicaul auricles at base, sometimes leaves slightly undulate along margin or subentire. Flowers white, racemose; sepals lanceolate, declinate, ca. 1.5 mm long; petals oboval, 3—4 mm long, tapering toward base into a short claw; silicles orbicular-ovate with a short beak curved to one side and a deep groove longitudinally (along sutures) with raised and somewhat thickened margins, ca. 3—3.5 mm long, 2—2.5 mm broad, glabrous, smooth, erect; fruiting pedicels up to 5—8 (10) mm long, horizontally declinate. May. (Plate XX, Figure 8).

Steppes and meadows. — European part: L. V.; W. Siberia: Irt.; E. Siberia: Dau.; Centr. Asia: Ar.-Casp. **Gen. distr.:** Mong. Described from the Lower Volga.

Genus 606. **GOLDBACHIA** * DC.**

DC., Syst. II (1821) 576.

Sepals erect, not saccate. Petals bluish pink. Filaments simple. 237 Annular emarginate nectariferous gland at base of shorter stamens inside and outside, one median nectariferous gland outside the pairs of longer stamens. Ovary sessile. Style short, bipartite. Stigma emarginate. Fruit erect on recurved pedicels, 1—3-seeded, aseptate, indehiscent, slightly twisted, prismatic tetragonous, abruptly tapering at base, terminating at apex with a beaklike style. Seed oblong, cotyledons flat, embryo notorrhizal. Glabrous annuals with lyrate radical leaves.

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* After the botanist Goldbach, who worked in Moscow at the beginning of the 19th century.

** Treatment by I. T. Vasil'chenko.

Central Asian genus.

1. Fruit beset with numerous minute vesicles . . . . 2.
+ Fruit without vesicles on surface . . . . 3.
2. Fruit nut-shaped, unilocular, markedly vesicular . . . 1. **G. verrucosa** Kom.
+ Fruit cylindrical-tetragonous, bilocular, finely vesicular . . . . 2. **G. papulosa** Vass.
3. Fruit cylindrical, tetragonous, smooth or transversely (and below) rugose . . . . 3. **G. laevigata** (M. B.) DC.
+ Fruit oblong-ovoid, broadening below, gradually tapering above, finely transversely reticulate and coarsely angular-rugose . . . . 4. **G. reticulata** (Ktze.) Vass.

1. **G. verrucosa** Kom. in Trav. Soc. Nat. Pétersb. Bot. XXVI (1896) 98; Korshinsky in Bull. Acad. Pétersb. V ser. IX, 423. — Exs.: H. F. A. M. No. 83.

Annual, 10—20 (30) cm high, rarely higher, with branching stem (more delicate than in G. laevigata); leaves petiolate, not amplexicaul; lower leaves lyrate-pinnatilobate, upper leaves narrowly oblong to sublinear, more or less dentate or subentire. Flowers racemose, lilac; sepals ca. 2—3 mm long, with veins not fusing at apex; petals longer than sepals; fruit nut-shaped, unilocular (rarely bilocular in the same plant), rugose, covered with verrucae and vesicles, walls thin, slightly tuberculate, 3—5 mm long, on pedicels several times (2—3 times) as long as fruit, curved to one side, with a small visible beak at apex. April. (Plate XX, Figure 12).

Mountain slopes. — Centr. Asia: Amu D., Pam.-Al., Syr D., T. Sh., Balkh. Endemic. Described from Pamir-Alai, from the villages of Kosa-Tarash, Kshtut, Moshan, and Shink on the Zeravshan.

2. **G. papulosa** Vass. sp. nova in Addenda VII, p. 480.

Annual, 20—30 cm high, divaricately branching, sometimes bluish; cauline, 238 leaves oblong-lanceolate or lanceolate, semiamplexicaul. Fruit bilocular, thickened, cylindrical-tetragonous, often dark, bluish, densely finely papillose, velvety in appearance, smoothly longitudinally rugose-tuberculate, ca. 10(12) mm long, 2.5 (3) mm broad, abruptly terminating at apex with a short (ca. 1.5—2 mm long) obtuse beak, ascending on pedicels much shorter than and rarely equal in length to silicles, recurved to one side. April. (Plate XX, Figure 15).

Mountain slopes. — Centr. Asia: Mtn. Turkm., Syr D., Pam.-Al. Endemic. Described from Kopet-Dagh, from the Ashkhabad District. Type in Leningrad.

3. **G. laevigata** (M. B.) DC., l.c.; Ldb., Fl. Ross. I (1842) 215; Boiss., Fl. Or. I (1867) 243; N. Busch, Fl. cauc. crit. III, 4 (1908) 231; Fedch., Rastit. Turkest. (1915) 445. — G. tetragona Ldb., Ind. sem. Hort. Dorpat. (1822); Fl. Ross. I, 215. — Rhaphanus laevigatus M. B., Fl. taur.-cauc. II (1808) 129. — Exs.: Bge., Alex., Lehm., Rel. bot. No. 150—152; HFR No. 1406; H. F. A. M. No. 82; Herb. Fl. Cauc. No. 217. — Ic.: Voron. in Fl. Yugo-Vostoka (1931) 434.

Annual; stem (5) 10—30 (40) cm high; radical leaves oblong-obovate, more or less sinuate-dentate to pinnatilobate along margin or entire, tapering at base into a petiole; cauline leaves gradually reduced toward summit, linear or oblong-lanceolate, sagittate at base, semiamplexicaul. Sepals narrowly lanceolate, ca. 2–3 mm long; petals twice as long as sepals, oval, tapering below, lilac; flowers racemose; silicles slender, cylindrical-tetragonous, smooth or wrinkled, usually bilocular, with transverse constriction between cells, 10–12 mm long, ca. 2 mm broad, recurved below (var. genuina Boiss.) or ascending (var. ascendens Boiss.), on recurved pedicels as long as silicles, beak ca. 1–2 mm long. April–May. (Plate XIX, Figures 10 and 13).

Steppes, mountain slopes, and as weeds in fields. — European part: L. V.; Caucasus: Dag. (Derbent); W. Siberia: U. Tob., Irt.; Centr. Asia: everywhere. **Gen. distr.:** Iran., Dzu.-Kash. Described from the Lower Volga. Type in Leningrad.

Note. G. laevigata (M. B.) DC. is represented in the USSR by two distinct geographical forms, the northern with pendulous fruit (v. genuina Boiss.) 11 and the southern with ascending fruit (v. ascendens Boiss.). In the mountains, even in the south (Central Asia, for example), v. genuina Boiss. is encountered.

4. **G. reticulata** (Ktze.) Vass. in Addenda VII, p. 481. — G. laevigata var. ascendens Boiss. f. reticulata Ktze. in A. H. P. X (1887) 166. — Exs.: Sintenis. It. transcasp.-pers. No. 61, sub G. tetragona det. Freyn.

Annual, 15–30 (40) cm high, glaucescent, with stem divaricately branching from base; radical leaves obovate or oblong-obovate, entire or more or less dentate, cauline leaves lanceolate, semiamplexicaul. Sepals 2–3 mm long, narrowly lanceolate, pubescent; silicles bilocular (rarely unilocular), oblong-ovate, tetragonous, somewhat compressed, broadening at base, tapering at apex into a rather long acute compressed beak (to 2.5–3 mm long), surface distinctly torulose, transversely nodose and rather moniliform, acutely reticular-alveolate, finely transversely rugulose, 8–10 (12) mm long, 2.5–3 (4) mm broad, ascending on much shorter pedicels, curved to one side or declinate. March. (Plate XX, Figures 11 and 14).

Plains, foothills, and sands. — Caucasus: Tal., S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kara K., Kyz. K., Syr D., T. Sh., Mtn. Turkm., Amu D. Endemic (?). Described from Kara-Kum. Type in Leningrad.

Genus 607. SPIRORHYNCHUS* KAR. et KIR.**

Kar. et Kir. in Bull. Nat. Mosc. XV (1842) 159.

Sepals suberect, saccate. Petals dingy white, small. Longer stamens connate in pairs by filaments, the shorter sterile. Fruit indehiscent, oblong, tetragonous, monospermous, rugose, with a long, compressed, narrowly winged and falcate beak at apex. Seed erect, oblong-linear. Cotyledons linear, embryo notorrhizal. — Low, slender annual plant.

Monotypic genus, Central Asian-Iranian.

1. **S. sabulosus** Kar. et Kir., l. c., 160; Boiss., Fl. Or. I (1867) 365; Ldb., Fl. Ross. I (1842) 768; Fedch., Rast. Turk. (1915) 446.

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* From the Greek sphira — coil, twist, and rhynchos — bill, beak.

** Treatment by I. T. Vasil'chenko.

(239)

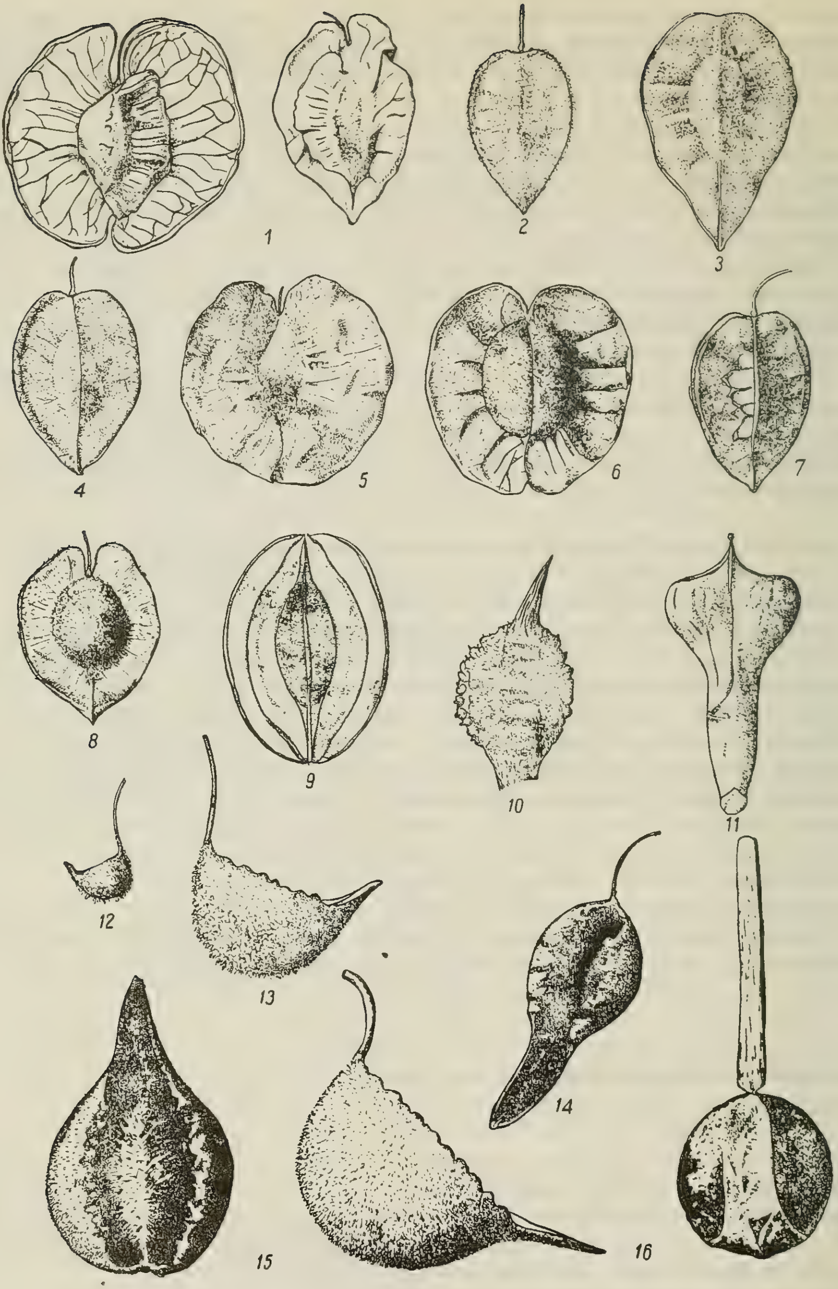

PLATE XIII. Fruits: 1 — Sameraria glastifolia (Fisch.et Mey.) Boiss.; 2 — S.turcomanica var. lasiocarpa (Korsh.) Vass.; 3 — S.aitchisonii (Korsh.) B.Fedtsch.; 4 — S.turcomanica (Korsh.) B.Fedtsch.; 5 — S.cardiocarpa Trautv.; 6 — S.canaliculata Vass.; 7 — S.bullata (Aitch. et Hemsl.) B.Fedtsch.; 8 — S.armena Desv.; 9 — Chartoloma platycarpum Bge.; 10 — Euclidium syriacum R.Br.; 11 — Myagrum perfoliatum L.; 12 — Tauscheria lasiocarpa Fisch. var.microcarpa Vass.; 13 — T.lasiocarpa Fisch.; 14 — T.oblonga Vass.; 15 — T.oblonga var. macrocarpa Vass.; 16 — Litvinovia tenuissima (Pall.) N.Busch.

Annual, 15–30 (40) cm high, glabrous, with dispersed bristles, grayish green, sometimes bluish below, divaricately branching from base, branches slender; leaves alternate, sessile, linear, largely sinuate-toothed with 242 retrorse teeth to pinnatilobate and pinnatipartite, the upper narrowly linear, frequently entire. Racemes long; pedicels thin and long (to 10 mm); sepals ca. 2 mm long, linear; petals linear, twice as long as sepals, dingy white; silicles with long falcate more or less spirally curved beak, short-bristly, reticular-rugose and alveolate, to (15) 20–30 mm long (with beak), on clavate pedicels thickened at summit. May. (Plate XX, Figure 5).

Sandy deserts. — Centr. Asia: Ar.-Casp., Balkh., Kara K., Kyz. K., Mtn. Turkm., Amu D., Syr D. **Gen. distr.:** Iran. Described from the Balkhash area (near Arganata and Sassyk-Pastau). Type in Leningrad.

Genus 608. **HESPERIS** * L.**

L., Sp.pl.(1753) 663; Gen.ed.5 (1754) 297.

Sepals erect, saccate at base. Petals long-clawed, lilac, white or yellowish. Filaments edenticulate, those of longer stamens flat. Lateral nectariferous glands united into a ring surrounding base of shorter stamens, 3-lobed outside, emarginate inside, median nectariferous glands absent. Ovary sessile, style short, stigma deeply bilobed, lobes oval, contiguous. Fruit linear, cylindrical or slightly tetragonous, slightly compressed, bivalvular, dehiscent, valves convex, with distinct midrib. Septum delicate, without fibrous veins, epidermal cells with numerous, transverse, parallel dividing walls. Seeds uniseriate, oblong, inflated, cotyledons flat, embryo notorrhizal. Hairs branched, frequently mixed with simple hairs, often also glandular. — Biennials and perennials with entire or pinnate leaves.

Of the 30 species of this genus we describe 13, but only 11 species have been found within the USSR. The genus is Mediterranean-Central Asian.

1. Flowers dingy yellow or greenish-grayish brown, silique spreading or pendulous . . . . 2.
+ Flowers purple, lilac or violet, siliques erect . . . . 4.
2. Siliques ascending. Pedicels spreading, longer than calyx, in fruit 19–30 mm long . . . . 11. **H. tristis** L.
+ Siliques pendulous. Pedicel shorter than calyx, in fruit 3.5–6.5 mm long . . . . 3.
3. Petal blade narrowly linear. Siliques puberulent (only under magnification) or glabrous . . . . 12. **H. persica** Boiss.
+ Petal blade oblong-lanceolate. Siliques covered with branched hairs shorter than breadth of silique . . . . 13. **H. pendula** DC. 243
4. Pubescence soft with very delicate branched hairs. Flowers violet or purple-violet. Leaves entire, more rarely sinuate-dentate, narrow . . . . 5.
+ Pubescence more or less coarse, hairs various but nearly always long and rigid . . . . 6.
5. Petal blade oboval, violet, 5–6 mm broad. Siliques with fine glandular hairs . . . . ★2. **H. violacea** Boiss.

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* From the Greek hespera — of the evening (some species fragrant in the evening).

** Treatment by N.A.Bush.

+ Petal blade elliptic-spatulate, purple-violet. Siliques glabrous . . . . 1. **H. bicuspidata** (Willd.) Poir.

6. All leaves broad, large-toothed. Pubescence without glandular hairs (Crimea and former Cherkess Autonomous Region) . . . . 7.

+ Leaves narrower, if broad then glandular-pubescent . . . . 8.

7. Flowers large, petals 24—28 mm long. Siliques somewhat pubescent . . . . 8. **H. steveniana** DC.

+ Flowers smaller; petals ca. 16 mm long. Siliques glabrous . . . . 9. **H. voronovii** N. Busch.

8. Hairs simple and branched with a glandular pubescence . . . . 9.

+ No glandular hairs . . . . 11.

9. Leaves broad, large-toothed, flowers large, petals lilac or white, 17—26 mm long. Siliques more or less pubescent or scabrous . . . . 7. **H. meyeriana** (Trautv.) N. Busch.

+ Leaves ovate-lanceolate or lanceolate, much narrower, the upper narrowly lanceolate. Siliques with glandular hairs . . . . 10.

10. Petals 15—19 mm long, lilac-pink or white (Siberia) . . . 6. **H. sibirica** L.

+ Petals 16—23 mm long, purple (southern Transcaucasia) . . . . 3. **H. armena** Boiss.

11. Hairs only simple . . . . *10. **H. karsiana** N. Busch.

+ Hairs simple and branched . . . . 12.

12. Leaves runcinate, incised-dentate or large-toothed . . . . 5. **H. sylvestris** Crantz.

+ Leaves denticulate . . . . 4. **H. matronalis** L.

Section 1. **PURPUREAE** Boiss., Fl. Or. I (1867) 230. — Petal blades purple, violet, or white.

1. **H. bicuspidata** (Willd.) Poir., Encyclop. Suppl. III (XI) (1813) 195; N. Busch in Fl. cauc. crit. III, 4 (1910) 653. — Cheiranthus bicuspidatus Willd., Sp. pl. III (1800) 519.

244 Perennial, softly tomentose with short branching delicate hairs; stems 20—70 cm high; radical leaves oblong, obtuse, emarginate-dentate, cauline leaves oblong-lanceolate, acute, acutely toothed. Sepals shortly scabrous, often violet, 8—9.5 mm long; petals 18—19 mm long, claw exserted from calyx, blade purple-violet, elliptic-spatulate, 3—4.5 mm wide; fruiting pedicels 6—13 mm long; siliques erect, glabrous (var. glabrisiliqua N. Busch) or densely puberulent (var. hebecarpa N. Busch), 4.5—7.5 cm long, 1.2—2 mm broad. May.

Slopes, mountain steppical slopes, 1,400 m and higher. — Caucasus: S. Transc. (Armenia). **Gen. distr.:** As. Min., Arm.-Kurd. Described from Armenia. Type in Berlin.

*2. **H. violacea** Boiss., Diagn. Sér. 1, V (1844) 80; Fl. Or. I (1867) 231; N. Busch in Fl. cauc. crit. III, 4 (1910) 653.

Perennial; entire plant covered with very short, soft, branching hairs; stems 25—30 cm high; radical leaves oblong, obtuse, entire or sinuate, more rarely runcinate, cauline leaves lanceolate, acute, subentire. Sepals pubescent, ca. 8 mm long; petals ca. 21 mm long, claw not exserted from calyx, blade violet, oboval, 6.5—7 mm wide; fruiting pedicels 5—10 mm long; siliques erect, finely glandular, thickish, torulose, slightly flattened, 6—7.5 cm long, 1.5—2 mm broad.

Gen. distr.: As. Min., Arm.-Kurd. Described from Asia Minor. Type in Geneva.

Note. Described in case it should be found within the USSR.

3. **H. armena** Boiss. in Ann. Sc. Nat. Sér. 2, XVII (1842) 63; N. Busch in Fl. cauc. crit. III, 4 (1910) 654.

Perennial, scabrous with branching and spreading simple hairs; stems 30—70 cm high; lower leaves oblong, obtuse, entire or eroded, tapering into a petiole, the upper leaves lanceolate, acute. Sepals 6—12 mm long; petals 16—23 mm long, claw hardly exserted from calyx, blade purple, oboval-oblong; fruiting pedicels 18—26 mm long; siliques erect, shortly glandular-pubescent or glabrous, thin, moniliform, rather torulose and compressed between seeds. May.

Forest margins. — Caucasus: S. and W. Transc. (Adzharistan). **Gen. distr.**: As. Min., Arm.-Kurd. Described from Asia Minor. Type in Geneva.

4. **H. matronalis** L., Sp. pl. (1753) 663; Ldb., Fl. Ross. I (1842) 171, 759; Shmal'g., Fl. I (1895) 62; N. Busch in Fl. cauc. crit. III, 4 (1910) 654; N. Busch, Fl. Sib. et Or. Extr. 6 (1931) 601. — Ic.: N. Busch, Fl. Sib. et Or. Extr. VI (1931) 602 et tab. geogr. 603.

245 Biennial, stem, leaves and pedicels covered with branching and simple hairs, stem sometimes stout, about 6—12 mm thick (var. robusia N. Busch), infrequently upper part of stem, pedicels, and upper leaves glabrous (var. glabra Trautv.); leaves ovate-lanceolate, acute, slightly dentate, the lower leaves petiolate, the upper subsessile, narrowly lanceolate. Calyx glabrous or pubescent, sepals 6—9 mm long; petals oboval, 17—22 mm long, lilac; fruiting pedicels spreading, 9—25 mm long; siliques glabrous, sometimes short-pubescent mostly at the lower part (var. eriocarpa N. Busch), long, constricted between seeds; seeds brown. April—May.

Steppical shrub-formations, forest clearings, and waste places. — European part: U. Dnp., U. V., V.-Don, V.-Kama, M. Dnp., Bl., L. Don, Transv., L. V., Crim.; Caucasus: Cisc., W. Caucasus, Dag., E. and S. Transc.; W. Siberia: Ob, U. Tob., Irt.; Centr. Asia: Balkh., Dzu.-Tarb., T. Sh. **Gen. distr.**: Med., Bal.-As. Min., Arm.-Kurd., N. Iran. Described from Europe. Type in London.

Economic importance. The seeds, a possible oil source, contain up to 50% oil. Young plants are fodder for horned stock. Both leaves and seeds possess diuretic and diaphoretic properties. The flowers are fragrant, particularly in the evening. The plant is ornamental, as are closely related species. A nectariferous plant.

5. **H. sylvestris** Crantz, Stirp. austr. I (1762) 34. — H. runcinata W. et K., Pl. rar. Hung. II (1805) 220. — H. elata C. A. M., Verz. Kolen. (1849) 52 (var. floribus albis). — H. inodora C. Koch in Linnaea XV (1841) 253. — H. matronalis var. runcinata Boiss., Fl. Or. I (1867) 233; N. Busch, Fl. cauc. crit. III, 4 (1910) 658. — Ic.: W. K., Ic. pl. rar. Hung. tab. 200; Rchb., Ic. Fl. Germ. tab. LVIII, f. 4376. — Exs.: Rchb., Fl. Germ. exs. No. 2467.

Biennial, 50—120 cm high; pubescence of branching hairs mixed with coarse spreading simple hairs, predominating on stem, sometimes upper part of plant glabrous or subglabrous (var. glabra N. Busch); leaves oblong-ovate or broadly ovate-lanceolate, acuminate at apex, sinuate-large-toothed, lower leaves often lyrate, petiolate, upper leaves subsessile, lanceolate. Sepals glabrous or pilose, 9—11 mm long; petals 22—24 mm long, obovate, lilac or white, claws slightly exserted from calyx; fruiting pedicels spreading, 9—25 mm long; siliques erect, subcylindrical, 5.5—12 cm long, 1.5—2 mm broad, constricted between seeds, glabrous or rarely puberulent (var. eriocarpa N. Busch); style 1.5—6 mm long; seeds brown, ca. 2.5 mm long, ca. 1 mm broad. May—June.

Forests, forest meadows, and among shrubs, 0—2,300 m. — European part: M.Dnp., V.-Don, Bl., L. Don, Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., 246 Tal. Gen. distr.: Centr. Eur., Bal.-As. Min., Syria (northern), Arm.-Kurd., Iran. Described from Austria. Type in Vienna.

6. **H. sibirica** L., Sp. pl. ed. 2, II (1763) 927; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 604. — H. matronalis var. siliculis glanduloso-pilosis Ldb., Fl. Ross. I (1842) 172. — H. matronalis Kom., Fl. Manchzh. 2 (1904) 391. — H. matronalis ssp. sibirica Kryl., Fl. Zap. Sib. VI (1931) 1380. — Ic.: N. Busch, l. c., 605 et tab. geogr. 609.

Biennial; stem 35—130 cm high, branching at upper part, stem, leaves, and pedicels covered with branching hairs mixed with simple and glandular hairs; leaves ovate-lanceolate, acute, dentate, rarely subentire, the uppermost narrowly lanceolate, sessile, the lower petiolate. Sepals 5.5—9 mm long; petals 15—19 mm long, lilac-pink (var. rubra Georgi) or white (var. alba Georgi), oboval, tapering at base into a long narrow claw exceeding calyx; fruiting pedicels spreading, 8—25 mm long; siliques 4—12 cm long, glandular-hirsute, constricted between seeds; seeds oblong, cylindrical-tetragonous, rimless. June—July.

Meadows, streams, riverbanks, riparian woods, forest margins, and thickets. — W. Siberia: Irt., Alt.; E. Siberia: Yenis., Ang.-Say., Dau., Lena-Kol. Endemic. Described from West Siberia. Type in London.

7. **H. meyeriana** (Trautv.) N. Busch comb. nova. — H. matronalis var. meyeriana Trautv., A. H. P. V, 2 (1877) 408; VII, 2 (1881) 411; N. Busch in Fl. cauc. crit. III, 4 (1910) 662.

Biennial; entire plant covered with branching hairs and spreading simple hairs — sometimes mixed with glandular ones, sometimes stem and leaves densely pubescent, with simple hairs, siliques densely glandular-hirsute (var. hirsutissima N. Busch); leaves broad, large-toothed, the lower sometimes lyrate. Flowers mostly large; sepals 6—9 mm long; petals 17—26 mm long, lilac or white, siliques usually more or less pubescent or scabrous. Similar in the rest to H. matronalis L. May—June.

Forest meadows, forest margins, up to 2,100 m. — Caucasus: Cisc. (Tushetiya), Dag., E. and S. Transc. Endemic. Described from Tushetiya (village of Chontio) and from Dagestan (town of Shalbuzdag). Type in Leningrad.

8. **H. steveniana** DC., Syst. II (1821) 452; N. Busch in Fl. cauc. crit. III, 4 (1910) 664. — H. matronalis var. siliquis glanduloso-pilosis b. foliis inferioribus runcinato-pinnatifidis Ldb., Fl. Ross. I (1842) 172. — H. matronalis var. steveniana Shmal'g., Fl. I (1895) 63.

Biennial; stem 30—60 cm high, squarrose-hispid at the lower part; 247 radical leaves petiolate, runcinate, the upper sessile, ovate-lanceolate, incised-dentate. Sepals 8—11 mm long; petals 24—28 mm long, purple-violet, claw distinctly exserted from calyx, blade obovate; pedicels thin, in fruit 9—20 mm long; siliques 7—10 cm long, up to 2 mm broad, erect, densely pubescent; seeds finely reticular-rugose, brown, 3.3 mm long, 1.3—1.5 mm broad. April—May.

Oak and other dry forests and clearings. — European part: Crim.; Caucasus: W. Transc. (Novorossiisk—Tuapse). Endemic. Described from the southern Crimea between Alushta and Gurzuf. Types in Geneva and Helsingfors.

Note. Related to a series of Crimean-Novorossiisk endemic species.

9. **H. voronovii** N. Busch in Acta Inst. Bot. Acad. Sc. URSS, Ser. I, fasc. III (1936) 358. — Ic.: ibid. 361, f. 3.

Perennial; stem low, 10—60 cm, branched, covered with spreading and simple retrorse hairs; radical leaves broadly ovate, 4.5—9 cm long, 3—6 cm broad, long-petiolate (petioles 5—9 cm long), cauline leaves ovate or oblong-ovate, all covered with white simple or rarely forked hairs on upper side and especially underneath along the veins, lower cauline leaves petiolate, the upper sessile. Sepals 5—6 mm long, with long white cilia at apex; petals ca. 16 mm long, white, clawed, blade oblong-obovate; fruiting pedicels 12—15 mm long, stoutish; siliques 2.5—7.5 cm long, constricted between seeds, valves longitudinally-nerved; stigma 2-lobed; seeds 2—2.5 mm long, ca. 1.5 mm broad, black-brown, angular, with a minute tuberculate sculpture. Fl. Fr. September. (Plate IV, Figures 1 and 2).

Limestones. — Caucasus: Western part of the Greater Caucasus. Endemic. Described from the upper reaches of the Belaya River, from Fisht Mountain. Type in Leningrad.

★10. **H. karsiana** N. Busch in Journ. Bot. d'URSS. T. 20, No. 1 (1935) 85.

Perennial; plant wholly scabrous with long white simple hairs, spreading and rather dense on stem and pedicels, appressed and sparse on leaves; stems many; leaves entire or sublyrate, acuminate at apex, radical leaves petiolate, uppermost cauline leaves sessile, all sinuate or undulate-dentate; pedicels short, 4—11 mm long, lower pedicels recurved already at flowering. Calyx 9—11 mm long, villous (not densely) with long white hairs mostly at apex; petals bright purple-violet, 18—21 mm long, 3—3.5 mm broad, oblong; anthers green; stigma 2-lobed; 2 nectariferous glands around base of shorter stamens, annular, with thin appendages somewhat thickened at apex above base of longer stamens.

Stony slopes. — **Gen. distr.:** Arm.-Kurd. (Kagyzman). Described from Kagyzman, from the southern stony slope. Type in Leningrad. 248

Note. Differs from other species of section Purpureae Boiss. by its pubescence, color of flowers, and short reclinate pedicels. Described in case it might be found within the USSR.

Section 2. **LIVIDAE** Boiss., Fl. Or. I (1867) 234. — Petals dingy yellow.

Subsection 1. ERECTAE N. Busch in Fl. cauc. crit. III, 4 (1910) 665. — Siliques erect.

11. **H. tristis** L., Sp. pl. ed. 2 (1762–63) 927; Ldb., Fl. Ross. I, 171; Shmal'g., Fl. I, 63; N. Busch in Fl. cauc. crit. III, 4 (1910) 665. — Ic.: Rchb., Ic. Fl. Germ. tab. LVII, f. 4374.

Biennial, squarrose-scabrous; stem 30–50 cm high, branching at summit, often glabrous at upper part; leaves entire or slightly dentate, the lower petiolate, ovate, cauline leaves lanceolate, sessile. Sepals 9–13 mm long; petals 18–30 mm long, blade oblong-cuneate, obtuse; fruiting pedicels spreading, 19–90 mm long, thickened; siliques glabrous or rarely pubescent (var. dasycarpa N. Busch), tetragonous-flattened, 6–18 cm long, 2.5–4.5 mm broad; seeds 2–3 mm long, 1.25–1.3 mm broad, brown-black, April–May.

Herbaceous and shrubby steppes. — European part: M. Dnp., V.-Kama, V.-Don, Bl., L. Don, L. V., Transv., Crim.; Caucasus: Cisc. (steppes). **Gen. distr.:** Eastern part of Centr. Eur., Bal. Described from Europe. Type in London.

Economic importance. Oil and forage plant. Flowers extremely fragrant in the evening.

Subsection 2. PENDULAE N. Busch in Fl. cauc. crit. III, 4 (1910) 667. — Siliques pendulous.

12. **H. persica** Boiss. in Ann. Sc. Nat. Sér. 2, XVII (1842) 64; Fl. Or. I, 236; Suppl. 46; N. Busch in Fl. cauc. crit. III, 4 (1910) 667. — Exs.: Aucher-Eloy, Herb. d'Orient. No. 4103; Th. Kotschy, Pl. Pers. austr. (1842) No. 271 et 428a; Pl. Pers. bor. (1843) No. 156.

Perennial, more or less scabrous with squarrose hairs; stem 25–35 cm high; leaves oblong-lanceolate, dentate or sublyrate at base. Racemes loose; sepals ca. 11.5 mm long; petals 24–26 mm long, 2–2.75 mm broad, narrowly linear; fruiting pedicels 3.5–6.5 mm long; siliques cylindrical, puberulent under magnification, or glabrous (var. leiocarpa Boiss.) with nerves not elongating to base, 4.5–7 cm long, 2–2.75 mm broad. May. 251

Hillside taluses, gravels, and among shrubs. — Caucasus: S. Transc. (Nakhichevan ASSR). **Gen. distr.:** Iran. Described from Iran. Type in Geneva; cotype in Leningrad.

*13. **H. pendula** DC., Syst. II (1821) 457; Boiss., Fl. Or. I, 236; N. Busch in Fl. cauc. crit. III, 4 (1910) 667.

Perennial, scabrous with short glandular hairs and long squarrose bristles; radical leaves petiolate, sublyrate, cauline leaves sessile, triangular-lanceolate, acutely dentate. Racemes loose, subsecund; pedicels short, scabrous; petal blade oblong-lanceolate; siliques cylindrical, slightly tuberculate, with branching hairs much shorter than breadth of silique.

Gen. distr.: As. Min., Syria, Arm.-Kurd. Described from Syria. Type in Geneva.

Note. Noted in case it is found within the USSR.

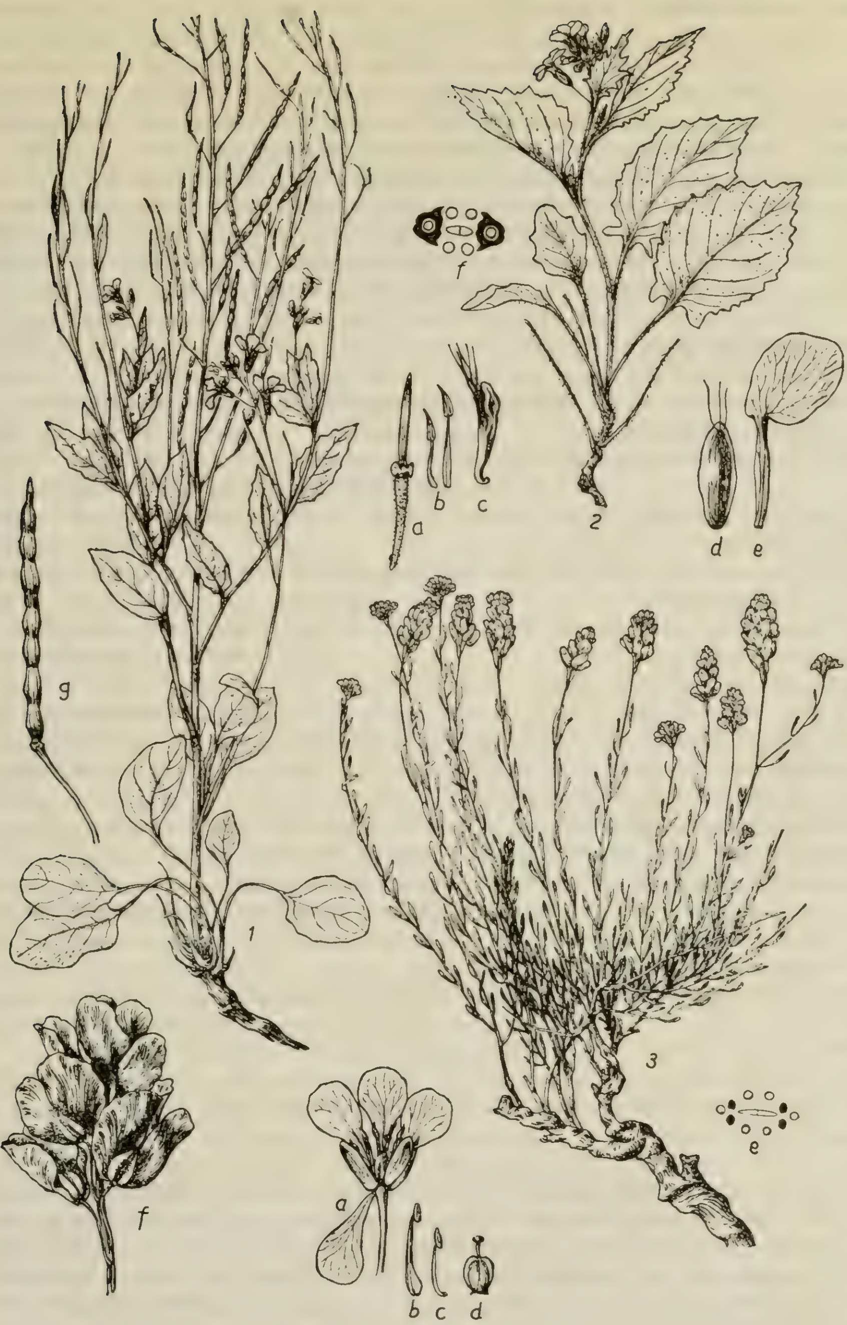

PLATE XIV. 1 — Hesperis voronovii N.Busch in fruit, g) fruit; 2 — H. voronovii N.Busch with flowers, a) ovary and nectariferous glands, b) short and long stamens, c) and d) sepals, e) petals, f) arrangement of nectariferous glands; 3 — Aethionema edentulum N.Busch with flowers and fruit, a) flowers, b) long stamen, c) short stamen, d) ovary, e) nectariferous glands, f) mature fruit.

Genus 609. **CLAUSIA** * KORN.-TR.**

Korn.-Tr.in Ind.sem.Horti Kazan. (1834).

Sepals saccate. Petals large, long-clawed, purple or white. Lateral nectariferous glands surrounding base of shorter stamens as a ring, open outside, median glands absent. Ovary sessile, stigma 2-lobed. Silique cylindrical-tetragonous, sometimes flattened, bivalvular but almost indehiscent. Valves with prominent midrib and more or less conspicuous lateral nerves. Septum with distinct fibrous strand and numerous parallel dividing walls of epidermal cells. Seeds uniseriate, embryo pleurorhizal. Hairs simple and glandular. Perennials with entire or dentate leaves.

1. Siliques glabrous . . . . 2.
+ Siliques pubescent . . . . 5.
2. Siliques more or less flattened, leaves sinuate-dentate or subentire, rarely pinnatipartite . . . . 3.
+ Siliques cylindrical, leaves deeply pinnatipartite . . . . 4. **C. hispida** (Rgl.) Lipsky var. **leiocarpa** Lipsky.
252 3. Plant glabrous or slightly pilose, petals 8–10 mm long, sepals 4–5 mm long, siliques 25–45 mm long . . . . 2. **C. kasakhorum** N. Pavl.
+ Plant pubescent, petals 10–20 mm long, sepals 6–10 mm long, siliques 30–100 mm long . . . . 4.
4. Siliques long and thin, 30–80 mm long, 1.2–1.5 (1.8) mm broad. Stem (5) 10–40 cm high . . . . 1. **C. aprica** (Steph.) Korn.-Tr.
+ Siliques 60–100 mm long, (1.8) 2–2.5 mm broad, plant 30–100 cm high . . . . 3. **C. turkestanica** Lipsky.
5. Plant 5–8 cm high, siliques densely beset with coarse somewhat scarious papillae . . . . 8. **C. papillosa** Vass.
+ Plant taller, fruit pubescent, not as above . . . . 6.
6. Siliques pubescent with simple and/or glandular hairs . . . . 7.
+ Siliques sparsely pubescent with conical papillae . . . . 9.
7. Siliques pubescent with fine glandular hairs . . . . 3. **C. turkestanica** var. **glandulosissima** Lipsky.
+ Silique pubescent with coarse and simple hairs . . . . 8.
8. Racemes dense and short . . . . 9.
+ Racemes loose, few-flowered. Siliques tetragonous-cylindrical . . . . 4. **C. hispida** (Rgl.) Lipsky.
9. Petals up to 5 mm broad, fruiting pedicels 10–15 mm long . . . . 5. **C. mollissima** Lipsky.
+ Petals narrow, linear, fruiting pedicels 2–8 mm long . . . . 6. **C. olgae** Lipsky.

1. **C. aprica** (Steph.) Korn.-Tr. in Ind. sem. h. Kazan. (1834); N. Busch, Fl. cauc. crit. III, 4 (1910) 698; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 663. — Cheiranthus apricus Steph. in Willd., Sp. pl. III (1800) 518. — Hesperis aprica Poir., Encycl. meth. Suppl. III (1813) 194; DC., Prodr. I (1824) 189; Ldb., Fl. Ross. I (1842) 173. — Hesperis cretacea Adams in Web. et Mohr Beitr. I (1805) 62, No. 30. — Ic.: N. Busch, Fl. Sib. et Or. Extr. VI (1931) 664 et tab. geogr. 667.

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* After Professor Klaus of Kazan, author of "Lokalfloren der Wolgagegenden."

** Treatment by I.T. Vasil'chenko.

Perennial, (5) 10–40 cm high, with one or few stems erect from crown, pubescent, with simple and minute glandular hairs; lower leaves oblong or oblong-obovate, petioled, cauline leaves oblong or oblong-linear to lanceolate-linear, sessile, all acutely denticulate or entire, directed upward; lower leaves rosetted, cauline leaves many, rather dense. Racemes dense and short; sepals glabrous or subglabrous, 6–10 mm long; petals twice as long as sepals, lilac-purple (sometimes white – var. albiflora N. Busch), tapering below, dilated above to
253 5–8 mm (10–15 mm in var. macropetala N. Busch); siliques erect, glabrous, finely longitudinally rugose, cylindrical, somewhat flattened and torulose (from exserted seeds), 30–80 mm long, ca. 2–1.5 (1.8) mm broad; fruiting pedicels 5–15 (20) mm long, finely glandular-pubescent, ascending-erect; style 1.5–1.8 mm long, stigma obtuse, slightly 2-lobed; seeds ovate-elliptic, 1.8–2 mm long, ca. 1–1.2 mm broad. May–July.

Steppes, stony and calcareous slopes, sandy places, dry valleys, and often in dry places in open forests. – European part: V.-Don, Transv., L. Don; Caucasus: Cisc.;. W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Yenis., Lena-Kol., Ang.-Say., Dau.; Centr. Asia: Ar.-Casp., Balkh. Gen. distr.: Dzu.-Kash., Mong. Described from more remote parts of Siberia. Type in Berlin.

Note. Of the many forms (varying in leaf-serration, pedicel-length, pubescence, etc.), we mention the white-flowered and the low growing ones – var. humilis Vass.; collection of more material (of these forms) is highly desirable.

2. **C. kasakhorum** N. Pavl., Fl. Tsentr. Kazakhst. II (1935) 305.

Perennial, 10–30 cm high, with few stems from crown, rather sparsely pubescent, with scattered, simple and finely glandular hairs; leaves mostly basal, many gray-blue-green, oblong or oblong-obovate, acutely dentate along margin, broad and long-petioled; sepals 4–5 mm long; petals 8–10 mm long. Fruiting pedicels 4–5 mm long, with small glandular hairs; siliques tetragonous-cylindrical, somewhat laterally compressed, glabrous, 25–45 mm long, 1.5–2 (2.5) mm broad, dehiscing when ripe; stigma sessile, 2-lobed; seeds 1.5–1.8 mm long, ca. 1–1.2 mm broad.

Stony slopes. – Centr. Asia: Syr D. Endemic. Description based on specimens collected near the town of Kzyl-Orda on the eastern rocky granite slopes of Ulu-Tau Mountain. Type in Leningrad.

3. **C. turkestanica** Lipsky, Mater. dlya Fl. Sr. Azii II (1904) 43 No. 118. – Diptychocarpus hispidus Rgl. in A. H. P. (1877) 230 p. p. – D. hispidus Rgl. var. robustus Korsh, in herb. – D. serawschanicus Kom. (non Rgl. et Schmalh.) and Tr. SPb. O-va Est. XXVI (1896) 84.

Perennial; plant with coarse stout stem, 30–100 cm high, simple or branching, pubescent (mainly in upper part) with simple, squarrose and finely glandular hairs; radical leaves rosetted, congested, large and long, oblong or oblong-obovate, long- and broad-petioled, more or less sinuate-
254 dentate (to pinnatipartite) or subentire; cauline leaves oblong-lanceolate, few, sessile, more or less dentate. Sepals 6–8 (10) mm long, subglabrous; petals 1.5–2 times as long as sepals, linear, dilated at apex to 2–3 (4) mm; siliques linear, flattened, up to 60–100 mm long, (1.8) 2–2.5 mm broad, glabrous (var. subintegrifolia Lipsky) or glandular-pubescent

(var. glandulosissima Lipsky); fruiting pedicels rough, glandular-pubescent, (5) 10—20 mm long; style abruptly distinct from silique, ca. 3—5 mm long; stigma obtuse. April—May.

Stony slopes and valleys. — Centr. Asia: Mtn. Turkm., Amu D., Syr D., Pam.-Al., T. Sh. Endemic. Described from Pamir-Alai, from the Baldzhuan District. Type in Leningrad.

4. **C. hispida** (Rgl.) Lipsky in A. H. P. XXIII (1904) No. 118. — Chorispora hispida Rgl. in Bull. Soc. Nat. Mosc. XLIII (1870) 266. — Diptychocarpus hispidus Rgl. et Schmalh. in A. H. P. V (1877) 230 p. p. — Exs.: H. F. A. M. No. 99.

Perennial, 20—50 cm high, with simple stem (or with few stems from crown) covered with many coarse squarrose hairs and finely glandular hairs; radical leaves many, congested, runcinate, pinnatipartite, narrowly oblong; cauline leaves few, deeply and acutely sinuate-dentate to pinnatipartite, with acute narrow lobes, oblong-linear. Racemes loose, few-flowered; sepals 8—10 mm long; petals narrow, linear-spatulate, 1.5—2 times as long as sepals; siliques tetragonous-cylindrical, 50—70 mm long, 1.8—2 mm broad, usually hispid (sometimes also glandular-pubescent), sometimes glabrous or subglabrous (var. leiocarpa Lipsky); fruiting pedicels clavate, thickened, densely beset with fine glandular hairs, 7—9 mm long; style up to 5 mm long; stigma small, capitate, slightly 2-lobed. March—April.

Mountain slopes and foothills. — Centr. Asia: Syr D. Endemic. Described from Syr Darya, from the Leninabad District (near Khodzhent) and Kokand. Type in Leningrad.

Note. Much more material of var. leiocarpa, referred here to this species and described from Chimkent District, is needed for a further study; I have tentatively related it to C. hispida.

5. **C. mollissima** Lipsky, Mat. Fl. Sr. Az. II (1904) 44.

Perennial, 20—40 cm high, densely covered with soft simple and short glandular hairs; stem stout, erect, simple or branching, profusely leafy; lower leaves large, many, congested, oblong or oblong-obovate, long- and broad-petioled, usually large-toothed to runcinate-pinnatipartite; cauline leaves acutely dentate or pinnatifid, with acute lanceolate lobes, oblong.
255 Racemes dense, many-flowered; sepals 8—10 mm long, densely pubescent; petals 1.5—2 times as long as sepals, oblong-oboval, rounded and dilated at apex to 5 mm; siliques 50—70 mm long, ca. 2 mm broad, with acute beak at apex, pubescent with simple and glandular hairs; pedicels coarse, 10—15 mm long. May.

Mountain slopes. — Centr. Asia: T. Sh. Endemic. Described from Tien Shan, from near Sailyk in Tashkent Ala-Tau. Type in Leningrad.

6. **C. olgae** (Rgl. et Schmalh.) Lipsky, Mat. Fl. Sr. Az. II (1904) 44. — Diptychocarpus olgae Rgl. et Schmalh. in A. H. P. V (1877) 230.

Perennial, 8—15 (20) cm high, densely covered mostly with long, simple hairs, somewhat mixed with glandular hairs; stem stout, simple or branching from base; nearly all leaves basal, oblong, petioled, deeply runcinate-pinnatisect or pinnatipartite, with slender lanceolate-linear or oblong lobes. Racemes short, dense; sepals 7—8 mm long, densely pubescent; petals ca. 15 mm long, linear, very narrow, somewhat dilated at apex; siliques fleshy, hispid-pilose, subtetragonous because of prominent midrib, 50–60(80) mm long, 1–2.5 mm broad, with elongated subulate stigma; fruiting pedicels coarse, thick 2–8 mm long. April. (Plate XVII, Figure 4).

Stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from the Zeravshan area, from Aksai. Type in Leningrad.

7. **C. serawschanica** (Rgl. et Schmalh.) Lipsky, Mat. dlya Fl. Sr. Az. (1904) No. 121. — Diptychocarpus sarawschanicus Rgl. et Schmalh. in A. H. P. V (1877) 231.

Perennial, many-stemmed, sparsely pubescent, simple hairs sparsely mixed with glandular ones; radical leaves rosetted, oblong, pinnatipartite, with remote oblong-lanceolate lobes, long- and broad-petioled; cauline leaves very few, oblong, more or less dentate. Racemes loose, few-flowered; sepals 7–8 mm long; petals twice as long as sepals, pale lilac, oblong, oboval, angustate below, dilated above up to 2.5–3 mm; siliques glabrous (or rarely beset with conical papillae), 60–80 mm long, ca. 1.8–2 mm broad, compressed-cylindrical; fruiting pedicels stout, slightly hairy, 3–5 mm long; stigma short, conical. April.

Stony slopes. — Centr. Asia: Pam.-Al. Endemic. Described from the Zeravshan area, from Dzhazman Gorge. Type in Leningrad.

8. **C. papillosa** Vass. in Addenda VII, p. 478.

Annual, 5–8 cm high, covered with long, white, thin, simple hairs and
256 coarser, short, conical, often subsquamose or somewhat papilliform,
white hairs (the latter predominating on siliques); leaves basal, oblong, small, petioled, more or less sinuate-dentate. Flowers few; sepals 7–9 mm long, densely hairy; petals 14–17 mm, tapering below, broadening to 3.5–4.5 mm above, rounded; fruit tetragonous-flattened, beset with dense, short, scarious, often somewhat papilliform hairs, 20–30 mm long, ca. 2 mm broad, terminating at tip with an acute conical beak 3–4 mm long; pedicels thickened, 2–3 mm long. April. (Plate XVII, Figure 4).

Stony slopes. — Centr. Asia: T. Sh. Endemic. Described from the area of Karatau Range (Ak-Kuz plateau). Type in Leningrad.

Genus 610. **PARRYA*** R. BR.**

R.Br.in Parry's Voy.App.(1824) 268; N.Busch Fl.Sib.et Or.Extr.VI (1931) 647.

Sepals divergent, the lateral usually saccate at base. Petals large, long-clawed, purple or white. Filaments free, edenticulate. Annular nectariferous gland around base of shorter stamens, open outside. Ovary sessile. Style short. Stigma 2-lobed. Fruit oblong or linear silique, flattened at back. Valves flat, with distinct midrib, netted-veined. Septum with undulant strand and many transverse dividing walls of epidermal cells. Seeds biseriate or uniseriate, flattened, winged or wingless. Cotyledons flat. Embryo pleurorhizal. Hairs bifid or simple. — Perennials with entire or pinnatipartite leaves and often with an aphyllous flower scape.

All the known 22 species of this Arcto-alpine genus native to the USSR.

* After the explorer Parry.

** Treatment by N.A.Bush.

The high mountains of Central Asia were the center of evolvement of the genus Parrya. From this area the genus was distributed over the mountains of East Siberia to the Arctic, where it formed a series of species all close to P. turkestanica.

1. Floriferous stems leafy (even if only with one leaf) . . . . 2.
+ Floriferous stems aphyllous, petals purple-pink or violet, more rarely white . . . . 6.
2. Petals white . . . . 3.
+ Petals violet . . . . 5.
3. Floriferous stems and leaves covered with bipartite (Malpighian) coarse white hairs . . . . 2. **P. microcarpa** Ldb.
+ Floriferous stems and leaves sparsely glandular-hairy. . . . . 4.
257 4. Petals ca. 6 mm long . . . . 1. **P. albida** M. Pop.
+ Petals 8—13 mm long . . . . 11. **P. karatavica** Lipsch.
5. Petals narrow, linear-oblong, dingy violet, 15—17 mm long, 3—4 mm broad. Siliques 5—7 cm long, 1.5 mm broad. Densely glandular-pubescent . . . . 16. **P. siliquosa** Krassn.
+ Petals 20 mm long, oboval, bright-colored, violet. Siliques 10—13 cm long, ca. 3 mm broad. Very sparsely glandular-hairy. Plant glabrous, larger than the preceding . . . . 17. **P. subsiliquosa** M. Pop.
6. Flowers small (petals ca. 6 mm long), siliques short (12—20 mm long) . . . . 19. **P. surculosa** N. Busch.
+ Flowers much larger . . . . 7.
7. Floriferous stems 1-flowered . . . . 8.
+ Floriferous stems few-flowered . . . . 9.
8. Pedicels and calyx glabrous, leaves glabrous or with very few hairs . . . . 21. **P. exscapa** C. A. M.
+ Pedicels, calyx, and leaves ciliate or with horizontally divergent bristly hairs . . . . 22. **P. eriocalyx** Rgl. et Schmalh.
9. Robust plant, with large obovate-oblong entire leaves; wholly beset with glands, including siliques (Shugnan) . . . . . . 3. **P. schugnana** Lipsch.
+ More slender plant, leaves differ in shape. Plant partly glandular-pubescent or if wholly — then with leaves pinnatifid . . . . 10.
10. Leaves pinnatifid. Plant glabrous or covered with glands and simple long hairs, ripe siliques glabrous . . . . 11.
+ Leaves entire or slightly incised, plant scantily glandular-pubescent . . . . 12.
11. Leaves regularly runcinate-pinnatifid; floriferous stems and pedicels usually covered with pedicellate glands. If pubescent — then with soft thin simple hairs . . . . 7. **P. pinnatifida** Kar. et Kir.
+ Leaves irregularly pinnatilobate; floriferous stems, pedicels, and leaves covered with long, white, simple, coarse, divergent, small-tubercled hairs . . . . 8. **P. beketovi** Krassn.
12. Undershrubs . . . . 13.
258 + Perennials with multicipital root . . . . 14.
13. Leaves runcinate-pinnatifid or sinuate-dentate, oblong or obovate . . . . 13. **P. runcinata** (Rgl. et Schmalh.) N. Busch.
+ Leaves entire, linear . . . . 10. **P. fruticulosa** Rgl. et Schmalh.

14. Siliques ca. 2 mm broad, 5–10 cm long. Leaves narrowly linear, entire or pinnatilobate with narrow lobes. Subglabrous plant, slightly ligneous at base . . . . 15. **P. stenophylla** M. Pop.
+ Siliques considerably broader . . . . 15.
15. Small, glaucous, glabrous plant. Leaves oblanceolate. Flowers lilac, petals broadly obcordate . . . . 18. **P. pulvinata** M. Pop.
+ Plants large, glabrous or pubescent, petals obcordate. Leaves entire or pinnatifid . . . . 16.
16. Siliques up to 13 cm long, ca. 3.5 mm broad, style 5 mm long . . . . 17.
+ Siliques much shorter and usually broader . . . . 18.
17. Petals 22–25 mm long . . . . 13. **P. stenocarpa** Kar. et Kir.
+ Petals up to 18 mm long . . . . 14. **P. golenkini** Lipsch.
18. Siliques 5–7 mm broad. Leaves pinnatifid or pinnatipartite toward apex. Plant not densely pubescent, with simple long hairs, covered with stalked glands (high mountains of Siberia and Central Asia) . . . . 1. **P. turkestanica** (Korsh.) N. Busch.
+ Siliques narrower than 6 mm broad. Leaves entire or dentate or irregularly serrate . . . . 19.
19. Entire plant covered with glands (therefore scabrous). Siliques 2.5–5 cm long, 3–4 mm broad (mountains of Central Asia) . . . . 2. **P. asperrima** M. Pop.
+ Glabrous or slightly glandular plant . . . . 20.
20. Leaves obovate, very short but broad. Siliques short and broad, 25–30 mm long, 6 mm broad. Seeds rounded with rather narrow yellowish membranous rim. Style nearly absent . . . 6. **P. arctica** R. Br.
+ Leaves long, much narrower, linear-oblong or lanceolate. Siliques long. Seeds with broad white membranous rim . . . . 21.
259 21. Glabrous or glandular plant. Leaves spatulate or linear-oblong. Siliques 3–6.5 cm long, 4–5.5 mm broad. Style 1.5–3 mm long . . . . 4. **P. nudicaulis** (L.) Rgl.
+ Completely glabrous plant. Leaves lanceolate. Siliques 4.5–6 cm long, 5–6 mm broad, style 4–6 mm long . . . . 5. **P. ajanensis** N. Busch.

Series 1. **Nudicaules** N. Busch.— Flowers large, lilac. Floriferous stems leafless. Leaves rosetted, entire or pinnate. Perennials with rhizome.

1. **P. turkestanica** (Korsh.) N. Busch in Addenda VII, p. 481. — P. macrocarpa var. turkestanica Korsh., Fragm. Fl. turk. (1898) 407.

Perennial; rootstock thick or thickish, branching above, to 50 cm long and to 1.5 cm thick; crown covered with decayed leaves; floriferous stem leafless, 4–30 cm long; leaves all radical, oblong-lanceolate or linear-oblong, tapering into a broad petiole, nearly always pinnatifid or pinnatipartite at upper part of blade, very rarely just with small teeth at apex, leaves more or less pilose on both sides, more or less densely covered with stalked glands. Racemes 5–10-flowered; sepals 5.5–9 mm long, 3–4 mm broad, white membranous along margin; petals purple or pink, 12–20 mm long, 5–9 mm broad, cordate or oboval, emarginate at apex; fruiting pedicels 6–20 mm long; siliques flattened, compressed at apex and base, 3–6.5 cm long, 5–7 mm broad; style 2–4 mm long; seeds light brown, elliptic, broadly winged, flat, 4–6 mm long, 3–4.5 mm broad (including wing). June–July.

Glacial moraines, gravels, stony places, rock streams, sands, alpine mountain zone. — E. Siberia: Ang.-Say., Dau.; Centr. Asia: Pam.-Al. (Zeravshan), T. Sh., Dzu.-Tarb. Endemic. Described from the alpine mountain zone of Central Asia, from Dzungarian Ala-Tau (Aral Dzhol) to the Pamirs. Type in Leningrad.

Note. This species is close to the Arctic P. nudicaulis and replaces it in the alps of Siberia and Central Asia.

2. **P. asperrima** M. Pop. in Sched. Herb. Fl. Asiae Med. Fasc. IV, III (1925) No. 98. — P. nudicaulis var. asperrima B. Fedtsch. in A. H. P. XXIII (1904) 384.

Perennial; entire plant shortly and densely glandular-scabrous; rootstock stout, woody, multicipital, with numerous, more or less congested shoots; floriferous stems short, stout, as long as or 1.5—2 times longer 260 than leaves; cauline leaves numerous, green, oblong or lanceolate, gradually tapering at base into a petiole about as long as blade, obtuse at apex, entire or few large-toothed. Racemes loose, 3—5-flowered; flowers large; sepals 9—10 mm long; petals lilac, ca. 20 mm long, claws exceeding calyx; style rather long, stigma 2-lobed; fruiting pedicels 10—20 mm long; siliques erect, flattened, 2.5—5 cm long, 3—4 mm broad, glandular-scabrous, valves with one distinct midrib; seeds flattened, uniseriate, with broad membranous wing, ca. 4 mm long, 3—3.5 mm broad (including wing); septum hyaline, thin, almost strandless, epidermal cells irregularly transverse. July.

Stony slopes, 2,500—3,000 m. — Centr. Asia: T. Sh. (western Talass Ala-Tau). Endemic. Described from western Tien Shan, from the Amu Tur area. Type in Tashkent.

Note. This species is close to P. turkestanica but differs as follows: its fruit is larger, seeds are uniseriate, the valves are not minutely netted-veined. It is distinguished from P. stenocarpa and P. pinnatifida by its broader and shorter siliques. It is very common in the Talass Ala Tau alps. In some specimens the fruit is damaged by insect bites.

3. **P. schugnana** Lipsch. in Fedde, Repert. XXXVIII (1935) 31.

Perennial; robust, entirely (including fruits), beset with glands; rootstock stout; floriferous stems leafless, 16—21 cm high; leaves rosetted, large, 6—13 cm long, 8—25 mm broad, obovate-oblong to lanceolate, obtuse or short-acuminate at apex, dentate-serrate along margin at upper part, gradually tapering into a petiole. Fruiting pedicels 10—35 mm long; siliques flattened, 3—7 cm long, 3—5 mm broad, flat or slightly wavy along margin; style 2 mm long; seeds uniseriate, flattened, with broad membranous rim, ca. 4 mm long, 3—4 mm broad. June.

Rocky crevices. — Centr. Asia: Pam.-Al. (Shugnan). Endemic. Described from a cliff over the Gunt River, in the area of Demion kishlak [village] and from the lower reaches of Shobek-Dara. Type in Leningrad.

Note. This species is the closest to P. asperrima M. Pop. and is distinguished by shape and leaf dimensions, by many-flowered racemes, and by greater roughness and size.

4. **P. nudicaulis** (L.) Rgl. in Bull. Soc. Nat. Moscou (1870) No. 11, 256; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 648 (excl. Asiam Mediam); Kom., Fl. Kamch. II, 194. — P. macrocarpa R. Br. in Parry's, I. Voy. App. (1824)

270; Ldb., Fl. Ross. I (1842) 131, 751; Turcz., Fl. baic.-dah. I, 124; Kryl., Fl. Zap. Sib. VI, 1393. — Cardamine nudicaulis L., Sp. pl. (1753) 654. — Ic.: Rgl. in Gartenfl. (1883) tab. 1128, fig. a, b. 261

Perennial, glabrous (var. glabra Hook.) or glandular-scabrous (var. aspera Hook.); rootstock stout, up to 50 cm long, 1.5 cm thick; floriferous stems leafless, 4—37 cm high; leaves all radical, spatulate- or linear-oblong, entire (var. integerrima Trautv.) or irregularly serrate or dentate (var. dentata N. Busch), tapering into a long petiole sometimes as long as the blade, sometimes to 3 cm broad (var. latifolia N. Busch). Sepals 5.5—9 mm broad, white-membranous along margin; petals purple or white, 12—20 mm long, 5—9 mm broad, cordate or oboval, emarginate at apex; fruiting pedicels 10—43 mm long; siliques flat, tapering at both ends, 3—6.5 cm long, 4—5.5 mm broad, on short, 1.5—2 mm stalks; style 1.5—3 mm long; seeds light brown, elliptic, broadly winged, flattened, 4—5.5 mm long, 3—4.5 mm broad (including wing). June—July.

Stony and sandy tundra and gravels. — Arctic: Arc. Eur.; W. Siberia (west): Chuk., An.; E. Siberia: Lena-Kol.; Far East: Okh., Kamch. Gen. distr.: Kurile Islands, Arc. Am. (Alaska, etc.) Described from Siberia, between Yakutsk and Okhotsk. Type in London.

Note. May be cultivated as an ornamental plant.

5. **P. ajanensis** N. Busch in Addenda VII, p. 483.

Perennial, completely glabrous; rootstock stout, multicipital, 5—13 mm thick; floriferous stems leafless; leaves rosetted, petioled, broadly lanceolate, acuminate at tip, entire or dentate, with petiole 7—16 cm long (petiole up to 1.5—10 cm long [sic!]). Fruiting pedicels short, 12—25 mm long, ascending-erect; siliques flattened, 4.5—6 cm long, 5—6 mm broad, constricted between seeds, with short pedicels; valves with one midrib and less distinct lateral reticulate veins; style 4—6 mm long; seeds with large white membranous wing mostly developed at apex, 7—7.5 mm long, (incl. wing), 3.5—5 mm broad. Ripe fruit August.

Far East: Okh. Endemic. Described from the vicinity of Ayan, from the swampy meadow along Sivachek brook, collected by V. N. Vasil'ev. Type in Leningrad.

Note. Species close to P. nudicaulis (L.) Rgl., Distinguished by its high stature (in fruit), longer style, and larger seeds. According to Vasil'ev, it grows abundantly in grasslands (swampy meadows).

6. **P. arctica** R. Br. in Parry Voy. App. (1824) 270.

Perennial, completely glabrous or with very few short hairs along margins of leaves; rootstock stout, 7—20 mm thick, often multicipital, with floriferous stems 6—12 cm high; leaves rosetted, petiolated, broad, obovate, 262 ovate or broadly lanceolate, with petiole 2.5—8 cm long (to 3 cm long), 7—18 mm broad, short-acuminate, dentate at apex. Sepals ca. 5 mm long, ovate, white-membranous at margin; petals lilac, with faint aroma of lilacs, broadly oboval, ca. 12 mm long, emarginate at apex, subcordate; fruiting pedicels ascending, 12—19 mm long; siliques short, 25—30 mm long, 6—7 mm broad, often constricted between seeds, flattened; valves without midrib, obscurely veined; seeds brown, with yellowish membranous rim, 2—4 mm in diameter (together with the rather narrow rim); style nearly absent (up to 0.5 mm); stigma small, 2-lobed, with convergent (erect) lobes. July—August.

Stony places, and gravels. — Arctic: Chuk. (Cape Dezhnev, Lavrentiya Bay). **Gen. distr.:** Arctic N. Am. Described from North America.

Note. Distinguished from P. nudicaulis (L.) Rgl. by the very distinct leaf-shape, by the almost complete absence of style, and by seeds with a much narrower yellowish rim, etc.

Series 2. **Pinnatifidae** N. Busch. — Flowers large, lilac. Floriferous stems leafless. Leaves rosetted, pinnate.

7. **P. pinnatifida** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 147; Rgl. et Schmalh. in A. H. P. V, 1 (1877) 235. — P. pinnatifida var. kizyl-arti Korsh., Fragm. Fl. Turk. I (1898) 409. — Ic.: ibid., Tabl. I, fig. 5 (mala).

Perennial, densely tufted; rootstock subterranean, above the ground reduced or elongated, stems nearly phylous toward summit, shortly and densely branching; above-ground branches and branchlets densely covered at base with decayed leaves; leaves petiolate, linear-oblong, regularly runcinate-pinnatifid, glabrous (var. glabra N. Busch) or (under magnification) scabrous with very short glandular bristles and thin, very soft simple white hairs (var. hirsuta N. Busch.). Floriferous stems exceeding radical leaves, usually rough (as are pedicels), with stalked glands; sepals ca. 9—10 mm long; petals purple, 20—25 mm long, oboval or obcordate, claw 1.5 times to nearly twice as long as calyx; siliques linear, 3—4.25 cm long, 3—3.5 mm broad, straight or curved, sometimes young siliques rough with shortly stalked glands, the mature siliques always glabrous; style longer than breadth of silique; seeds with membranous hyaline rim. June—July.

Rocks in the alpine zone. — Centr. Asia: Pam.-Al., Dzu.-Tarb., T. Sh. Endemic. Described from rocky crevices of the highest mountains in Ala-Tau along the Lepsa and Sarkhan rivers. Type in Leningrad.

8. **P. beketovi** Krassn. in Zap. R. G. O., po obshchei geografii XIX (1888)
263 334—335 (descriptio pessima).

Perennial; rootstock multicipital, branching; leaves, floriferous stems, pedicels, and calyxes covered with coarse long white simple hairs (cilia) tubercled at base; all leaves radical, irregularly pinnatilobate, lobes dentate or entire, leaves spatulate-obovate, rarely lanceolate, short-petiolate. Floriferous stems leafless, many-flowered, in fruit to 30—40 cm high; fruiting pedicels 10—23 mm long; sepals more or less dark purple, 10—22 mm long; petals 20—23 mm long, lilac or pink, with claw longer than calyx; siliques 4—8 cm long, 3—4 mm broad, with one distinct longitudinal vein, when immature covered with coarse hairs, glabrescent toward end; style 1—3 mm long, narrowly winged at base. May—June.

Rocks and clayey slopes. — Centr. Asia: T. Sh. Endemic. Described from Charyn Valley (southeast Tien Shan). Type in Leningrad.

Note. Related to P. turkestanica and P. pinnatifida; it is distinguished from both species by the complete absence of glandular hairs. It differs from P. pinnatifida in its habitus, siliques, many-flowered stems, pilosity and leaf shape, and from P. turkestanica in pubescence and narrower siliques.

Series 3. **Fruticulosae** N. Busch. — Undershrubs, with entire leaves. Flowers lilac or white, varying in size.

9. **P. fruticulosa** Rgl. et Schmalh. in A. H. P. V (1877) 237.

Shrub, nearly completely glabrous, small and low, branching; branches leafless, annual branchlets leafy; leaves deciduous, linear-oblong or rarely linear-lanceolate or oblong, entire or slightly dentate (var. subintegra Rgl. et Schmalh.), sometimes ciliate- and glandular-pubescent. Floriferous stems longer than radical leaves, ending in a 3-flowered or rarely 1- or 2-flowered raceme; pedicels shorter than flowers, in fruit 19—24 mm long; calyx saccate, purple, 9—11 mm long; petals obcordate, light red, 20—28 mm long, claw nearly as long as calyx, anthers linear-oblong; siliques linear-oblong, style short, stigma shortly 2-lobed. May—July.

800—3,000 m. — Centr. Asia: Dzu.-Tarb., Syr D., T. Sh., Pam.-Al. Endemic. Described from Kokan, Zeravshan River valley, Aksai, 800—2,000 m. Type in Leningrad.

10. **P. albida** M. Pop. ex P. Baran. in Journ. Turkest. Branch. Russ. Geogr. Soc. XVII (1925) 26, tab. II. — Exs.: H. F. A. M. No. 97.

Small undershrub, branched stem becoming woody, thin but firm, procumbent to ascending, with annual floriferous shoot at summit: shoots
264 erect, 5—10 cm high, leafy, simple or branching, with white bark; leaves sparsely glandular-pubescent or slightly hairy, linear or lanceolate-linear, acute, remotely serrate-dentate along margin, stout, somewhat tapering toward base. Floriferous shoots to 15 cm high, thin, firm, glabrous or sparsely glandular-pubescent; pedicels as long as calyx, in fruit up to 1 cm long; sepals oblong, obtuse, with narrow white rim; petals whitish, ca. 6 mm long, blade narrowly cuneate, truncate or slightly emarginate; siliques erect or slightly declinate, broadly linear, 2—6 cm long, ca. 3 mm broad, flattened, straight or sometimes flexuous or twisted, valves with a distinct vein and obscurely netted; style thin, 2 mm long, stigma 2-lobed; seeds flattened, marginate, 2.25 mm long without wing, wing wide. July.

Rocks and stony slopes, 2,000—3,000 m. — Centr. Asia: western T. Sh. Endemic. Described from Bol'shoi Chimgan. Type in Tashkent.

Note. Closely related to P. fruticulosa but distinguished by its 2—3 times smaller white (not violet) flowers, glandular hairs, sharply serrate-dentate leaves, and other characters.

11. **P. karatavica** Lipsch. in Fedde, Repert. XXXIX (1936) 318.

Undershrub, with rather long thin underground shoots developed at summit into floriferous herbaceous stems, 2—8 cm high, ascending or hanging from rocky crevices, branching or simple, pubescent; leaves rosetted at base, more or less densely pubescent with few glands, radical leaves subspatulate or broadly ovate, 0.5—1.5 cm long, cuneate, entire or obscurely few-denticulate at apex, obtuse, whitish beneath; cauline leaves smaller, lanceolate, obtuse, very short-petioled. Racemes 5—9-flowered; pedicels thin, 0.3—1.2 cm long; sepals ca. 5 mm long, stellate-hairy, oblong or ovate, obtuse, with very narrow white rim; petals white, 0.8—1.3 cm long, 0.4—0.6 cm broad, with blade oblong-oval, truncate or slightly emarginate at apex, claw 2—4 mm long; siliques broadly linear, 1,7—2.8 cm long, 3—4 mm broad, flattened, straight or slightly wavy along margin, style 2 mm long, valves with distinct midrib and obscure, lateral veins. May—June.

Stony places and rocks. Centr. Asia: T. Sh. Endemic. Described from Kara-Tau and Terseilan mountains. Type in Moscow.

Note. Differs from P. albida in its habitus, many-leaved rosettes, leaf shape, flower dimensions, and type of pubescence.

12. **P. runcinata** (Rgl. et Schmalh.) N. Busch in Addenda VII, p. 482. — 265 P. fruticulosa β runcinata Rgl. et Schmalh. in A. H. P. V (1877) 237.

Undershrub, subglabrous, sometimes with simple hairs on petioles only, rarely on blades; stem branching, woody, branches ending in annual herbaceous shoots leafy at the lower part; leaves oblong or obovate-oblong, more or less sinuate-dentate or runcinate, pinnatifid, petiolar, obtuse or short-acuminate at apex. Raceme few-flowered (to 5 flowers); sepals 9—11 mm long, oblong, more or less lilac in color; petals lilac, oblong-obovate, rounded or slightly emarginate at apex, unguiculate, 25—30 mm long, claw longer than calyx; fruiting pedicels 9—16 mm long; siliques linear, 5—6 cm long; style rather long (3.5—4 mm), stigma 2-lobed. June—July.

Rocks and stony slopes. 1,900—3,300 m. — Centr. Asia: Syr D., Balkh., T. Sh., Pam.-Al. Endemic. Described from the Zeravshan Basin, Kadzhar Pass. Type in Leningrad.

Note. Distinctly differing from P. pinnatifida by an almost complete absence of hairs and from P. fruticulosa by the long style, the leaf shape, and claws longer than the calyx.

Series 4. **Stenocarpae** N. Busch. — Siliques narrow. Petals lilac or purple. Perennials.

13. **P. stenocarpa** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 147; Ldb., Fl. Ross. I (1842) 751; Kryl., Fl. Zap. Sib. VI (1931) 1393.

Perennial; rootstock ligneous, stout and long, multicipital; leaves (excluding radical but like entire plant) glabrous throughout (var. glabra Kryl.) or covered with glandular (mixed with simple) longer thinner hairs, glabrescent when fruit ripe, blade oblong-elliptic, oblong or lanceolate, sometimes linear-lanceolate, tapering at both ends, entire or sinuate-dentate or pinnatifid, 1—5 cm long, 3—15 mm broad, nearly as long as petiole or half as long; floriferous stems leafless, 5—15 cm high. Raceme 2—7-flowered, elongating in fruit up to 8 cm long; pedicels 1—2.5 cm long; sepals erect, linear-oblong, obtuse, with white rim, 9—10 mm long, 2.5—3 mm broad; petals lilac, 22—25 mm long, 8.5—12 mm broad, obcordate, emarginate at apex; claw as long as blade, linear; siliques linear, flat-compressed, 6—12 cm long, ca. 3.5 mm broad, with one distinct midrib, laterally netted-veined, style 5 mm long; seeds subelliptic, flattened, dark grayish brown, ca. 5 mm long, 3 mm broad, with white membranous semihyaline rim up 266 to 1 mm broad, especially at the ends. June—July.

High-mountain zone, meadows, pebbly and stony slopes. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb. (Saur, Tarbagatai, Dzungarian Ala-Tau), T. Sh., Pam.-Al. Endemic. Described from rocks of Ala-Tau Range between the Baskan and Sarkhan rivers. Type in Leningrad.

14. **P. golenkini** Lipsch. in Fedde, Repert. XXXIX (1936) 319.

Perennial; rootstock stout, with long woody underground shoots, densely covered with decayed leaves; stems leafless, 7—12 cm high, glandular-scabrous, ascending; leaves very few, narrow, linear-lanceolate, 2—7 cm long (including petiole), 0.2—0.5 cm broad, more or less obtuse, long-petioled, entire or sometimes inconspicuously denticulate, sparsely glandular. Raceme loose, 2—7-flowered; pedicels thin, glandular, 0.3—1 cm long; sepals glandular, 8 mm long, with white or sometimes purple rim; petals purple, up to 18 mm long, blade broadly oboval, 6—8 mm long, emarginate at apex, claw 10—11 mm long, almost twice as long as calyx. May.

Centr. Asia: T. Sh. (W.). Endemic. Described from Kara-Tau Mountains, limestones, and rocks of Ak-Sumb. 750 m. Type in Moscow.

Note. Close to P. stenocarpa, distinguished by its glandular pubescence, the shoots densely covered with relics of old leaves, and habitus. Siliques unknown.

15. **P. stenophylla** M. Pop. in Addenda, VII, p. 483.

Perennial, green, glabrous, except for sparse, long, very thin hairs on calyx, pedicels, and sometimes scapes; rootstock many-branched, with elongated subcespitose thin woody branches; leaves all radical, frequently entire, narrowly linear, partly pinnatifid, lateral segments linear, pectinate, few, terminal segment long-linear; flower scapes erect, thin, slightly longer than radical leaves, 5—12 cm high. Racemes few-flowered, loose; sepals purple, oblong, obtuse, ca. 10 mm long, the outer saccate; petals violet, 20—25 mm long, blades obcordate, as long as claw; siliques narrowly linear, 5—10 cm long, ca. 2 mm broad, erect, gradually tapering into a rather long style. July.

Centr. Asia: T. Sh. Endemic. Described from the Tyuk-Su glacial
269 moraine in the upper reaches of Malaya Almatinka. Type in Tashkent.

Note. A very lovely plant, related to P. stenocarpa, deserving to be cultivated.

16. **P. siliquosa** Krassn. in Zap. R. G. O. po obshchei geografii, XIX (1888) 334.

Perennial; all leaves radical, glabrous, with a tuft of cilia at tips of lobules, pinnatilobate or pinnatifid; floriferous stems leafless, erect, many-flowered, together with pedicels and calyx densely glandular. Racemes 5—14-flowered; sepals purple-green with white membranous hyaline rim, equal; petals 15—17 mm long, 3—4 mm broad, oboval, notchless at apex, pink-lilac, claw not longer than calyx; fruiting pedicels stout, 6—8 mm long; siliques very narrow, 5.5—7 cm long, 1.5 mm broad, style 3 cm long.

Centr. Asia: T. Sh. Endemic. Described from Kulja Basy Mountain (Tien Shan). Type in Leningrad.

17. **P. subsiliquosa** M. Pop. in Addenda VII, p. 482.

Perennial; almost glabrous but with few capitate-glandular hairs; rootstock 1—3-headed, squamose at summit; stem 30—60 cm high, erect, subcylindrical, simple, leafy at lower part; radical leaves long-petiolate with rather flat petioles as long as to longer than blade, blades oblong, lyrate-pinnatilobate, lobes few, triangular, acute or ovate, and obtuse, the terminal larger, almost obtuse or acute, sometimes blades subentire with few teeth; cauline leaves 1—3, similar to the radical but sessile and subentire, acute, the uppermost borne below middle of stem, sometimes sublinear. Raceme simple, few-flowered, loose; pedicels 5—10 mm long,

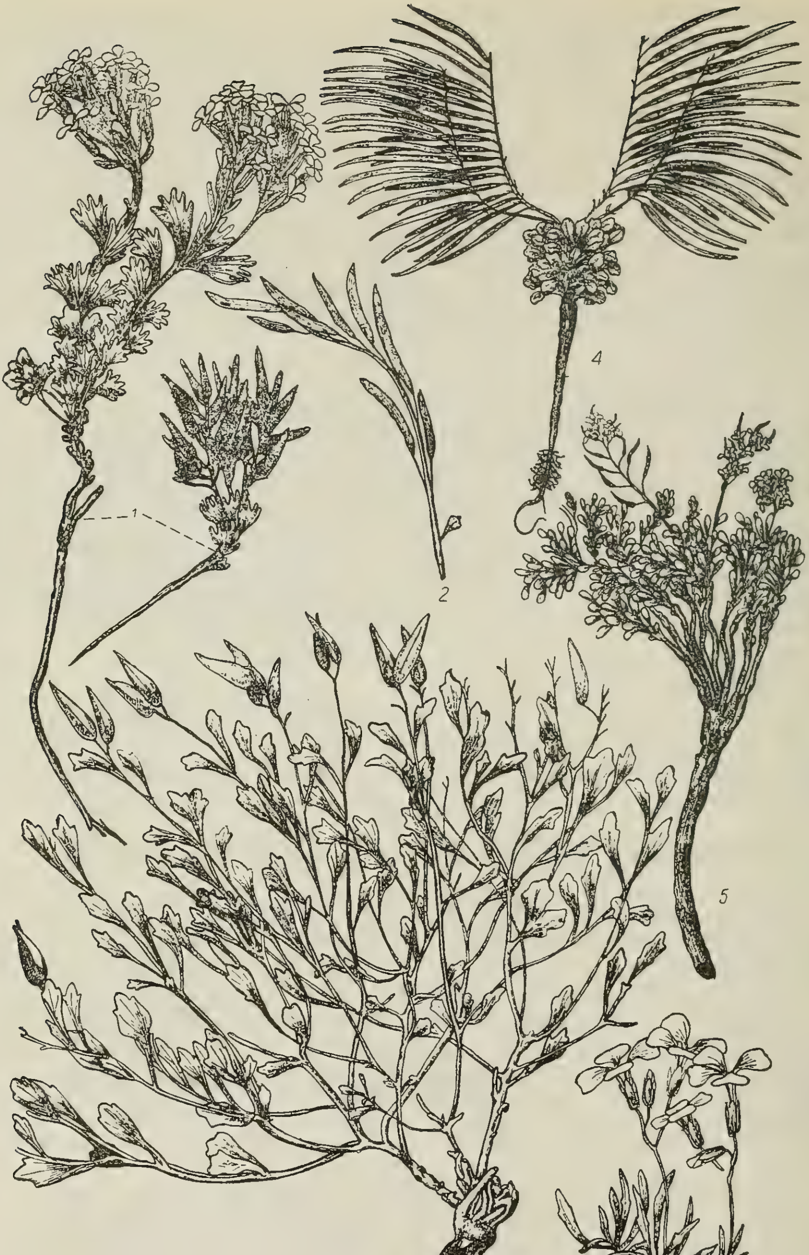

PLATE XV. 1—Christolea flabellata (Rgl.) N.Busch; 2—C. ermani (Ldb.) N.Busch, fruits; 3—C. crassifolia Camb.; 4—C. linearis N.Busch; 5—Parrya surculosa N.Busch; 6—P. pulvinata M.Pop.

covered with capitate stalked glands; sepals purple, linear-oblong, ca. 10 mm long, with few glandular hairs; petals violet, 20 mm long, blade oboval, slightly emarginate, as long as claw; fruiting pedicels stout, up to 2 cm long; siliques flattened, linear, ca. 3 mm broad, dottedly glandular when immature, glabrous when ripe, valves with prominent midrib and lateral netted veins, abruptly ending in a cylindrical beak 4—7 mm long, stigma 2-lobed; seeds flattened, oval, with a rather wide wing, 3 mm long. June.

Centr. Asia: T. Sh. Endemic. Described from Trans-Ili Ala-Tau, from the Malaya Almaatinka and Talgar rivers. Type in Tashkent.

Note. Differs from P. siliquosa Krassn. in being more robust, petals and siliques twice as large, and glandular hairs very sparse.

270 Series 5. **Pulvinatae** N. Busch. — Glaucescent, glabrous, small plants, densely tuffed. Flowers large, lilac.

18. **P. pulvinata** M. Pop. in Addenda VII, p. 483.

Perennial; plant small, glabrous, glaucescent, 4—11 cm high; rootstock stout, multicipital, covered with relics of dried leaves underneath rosette; leaves oblanceolate, tapering into a petiole, all radical, 4—5 cm long, ca. 4 mm broad; floriferous stems leafless. Sepals lilac-green, with membranous white rim, lilac here and there, ca. 9 mm long; petals lilac, broadly obcordate, clawed, 22—25 mm long, much longer than calyx; pedicels at flowering 9—12 mm long. June—July. (Plate XV, Figure 6).

Rocks. — Centr. Asia: T. Sh. (Talass Ala-Tau). Endemic. Described from the Kish Aksu River valley near the estuary of the Bugulen Sai River, ca. 2,800 m. Type in Leningrad.

Note. May be cultivated as an ornamental plant.

Series 6. **Surculosae** N. Busch. — Flowers small. Pubescence tomentose. Perennials with very long shoots; habitat: mobile taluses.

19. **P. surculosa** N. Busch in Addenda VII, p. 484.

Perennial, densely canescent-tomentose with small stellate hairs covering entire plant including calyx and petals; rootstock with decayed leaves and live rosetted ones at summit; branching at top into many thinner but very long shoots bearing branches sometimes to ca. 30 cm long; leaves obtuse, spatulate-oblong, tapering at base into a long and broad petiole. Floriferous stems leafless, with about 10—15 or even more small flowers; sepals orbicular to broad-ovate, rounded at apex, with membranous hyaline rim, purple-green, ca. 3 mm long, ca. 2 mm broad; petals oboval, rounded at apex, notchless, white above, purple below, ca. 6 mm long, ca. 3 mm broad, claw shorter than calyx; fruiting pedicels ca. 7—10 mm long; siliques 12—20 mm long, ca. 2 mm broad; style ca. 1.5—2 mm broad. (Plate XIV, Figure 5).

Mobile taluses. — Centr. Asia: Pam.-Al. (Shugnan). Endemic. Described from the ascent from Kaldok to a pass on Abkhar. Type in Leningrad.

Series 7. **Microcarpae** N. Busch. — Pubescence of Malpighian hairs. Floriferous stems leafy. Flowers small, white. Siliques short.

20. **P. microcarpa** Ldb., Fl. Ross. I (1842) 132; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 657. — Draba grandiflora C. A. M. in Ldb., Fl. Alt. III (1831) 74. — Parrya grandiflora Schischk. in Kryl., Fl. Zap. Sib. VI 271 (1931) 1394. — Ic.: Ldb., Ic. pl. Fl. Ross. tab. 267; N. Busch, l. c., 658 et tab. geogr. 659.

Perennial; rootstock 1—3 mm thick, developing few short shoots covered at base with pale squamose small basal leaves, bearing rosettes of green radical leaves and leafy floriferous stems 4—12 cm high; leaves elliptic or oblong, entire, radical leaves tapering to a more or less long petiole, cauline leaves sessile, smaller, usually narrower and acute; leaves and stems covered with bifid (Malpighian) stiff white hairs. Raceme short, dense at flowering, hardly elongating in fruit; sepals with few soft white hairs above, 3—4 mm long, 1.5—2 mm broad; petals white, oboval, short-clawed, 6—7 mm long, 4.5—5 mm broad; fruiting pedicels 3.5—9.5 mm long, glabrous; siliques glabrous, linear-oblong, tapering at both ends, 8—20 mm long, flattened; seeds rimless or wingless, brown, 1.25—1.5 mm long, 1—1.3 mm broad, 5—15 in each cell. June—July.

Taluses and stony places of the alpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say. **Gen. distr.:** Mong. Described from mountains along the Chuya River. Type in Leningrad.

Series 8. **Exscapae** N. Busch. — Scapes 1-flowered. Petals lilac, large. Siliques very long. — Plant densely cespitose.

21. **P. exscapa** C. A. M. in Ldb., Fl. Alt. III (1831) 28; Ldb., Fl. Ross. I, 132, 752; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 654; Kryl., Fl. Zap. Sib. VI (1931) 1392. — Ic.: N. Busch, l. c., 655 et tab. geogr. 656.

Perennial; rootstock cylindrical, long, stout, multicipital, developing pale subterranean straight shoots ca. 3 cm long, bearing rosettes of leaves and pedicels; leaves thick and rigid, glabrous or few-hairy, obovate to subelliptic, rounded at apex, tapering at base into a long petiole, entire or obscurely toothed, sometimes sublyrate, blade ca. 15 mm long, ca. 8—10 mm broad. Floriferous stems leafless, glabrous, 1-flowered, 2—3—6 cm long; sepals 8—10 mm long; petals oboval, long-clawed, lilac, fragrant, 16—21 mm long, 8—10 mm broad; siliques ascending, 5—10 cm long, ca. 6 mm broad, lanceolate, acuminate at apex, rounded at base, flattened, with weak midrib; style nearly absent (to 0.5 mm long); seeds flattened, dark brown, with narrow wing, ca. 3.5 mm long and 2—2.25 mm wide. May—June.

High-mountain, stony places. — W. Siberia: Alt.; Centr. Asia: T. Sh., Pam.-Al. (Zeravshan Range). Endemic. Described from mountains along the Kurai and Chegan rivers, tributaries of the Chuya River. Type in Leningrad.

Note. May be cultivated as an ornamental plant.

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22. **P. eriocalyx** Rgl. et Schmalh. in A. H. P. V (1877) 234.

Perennial, low, densely cespitose plant, 2—9 cm high; rootstock stout, multicipital; all leaves radical, spatulate-obovate, tapering into a very broad petiole, entire, ciliate mainly on petiole with horizontally spreading bristly hairs. Floriferous stems branched directly from rootstock, 1-flowered, thin, several times longer than flowers, as long as or longer than leaves, sparsely covered with bristles; sepals rather densely covered with simple hairs (whitish-hispid), 9—12 mm long, the lateral saccate; petals oboval, rounded at summit, ca. 20 mm long, claw as long as or slightly longer than calyx; anthers linear-oblong; siliques glabrous, 4—7 cm long, 4—6 mm broad, often twisted, with a weak midrib; style 0.5 mm long. June—July.

River gravels, mountain passes, clayey slopes, grassless areas, ca. 3,000 m. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Terekty Pass. Type in Leningrad.

Genus 611. **ATELANTHERA** * HOOK. f. et THOMS.**

Hook.f.et Thoms.in Journ.Linn.Soc.V (1861) 129, 138; Hayek, Cruciferen-System. (1911) 224.

Sepals equal, erect. Petals linear-spatulate; stamens free, the longer with unilocular anthers, the shorter with bilocular. An oblong-terete nectariferous gland along both sides of the shorter stamens, median glands absent. Ovary short, style short, stigma 2-lobed. Fruit a linear, slightly dorsally compressed silique with somewhat convex valves and a weak vein. Septum thin, without fibrous strand, epidermal cells with numerous parallel dividing walls. Seeds uniseriate, slightly flattened. Cotyledons flat. Embryo pleurorhizal. Hairs bifid. — Annual.

Monotypic genus, native to Central Asia and Tibet.

1. **A. perpusilla** Hook. f. et Thoms. in Journ. Linn. Soc. V (1861) 138; Fedtsch., Consp. I (1906) 38.

Annual, glabrous plant, only siliques covered with Malpighian (bifid) hairs; stem slender, flexuous, divaricately branching, 2.5—16 cm high; leaves entire, linear. Sepals 2—2.5 mm long, narrowly oblong; petals 3—4.5 mm long, pink; fruiting pedicels 2—12 mm long, ascending; siliques linear, 15—22 mm long, 1—1.25 mm broad; valves appressed-hairy, style 1.5—1.75 mm
273 long; seeds light brown, ca. 1 mm long, ca. 0.75 mm broad. June.

Stony places. — Centr. Asia: Pam.-Al. . **Gen. distr.**: W. Tib. Described from western Tibet. Type in London.

Genus 612. **MALCOLMIA** † R. BR.††

R.Br.in Ait.Hort.Kew.ed.2, IV (1812) 121.

Sepals erect, the lateral often somewhat broader than the median and slightly saccate at base. Petals white or lilac. Stamens free or the longer close to each other forming pairs but not united. A small pyramidal nectariferous gland on both sides of shorter stamens. Ovary sessile, style short-cylindrical, stigma more or less deeply 2-lobed. Fruit a linear tetragonous-cylindrical silique, valves 3-nerved. Septum firm, with fibrous strand and numerous parallel dividing walls of the epidermal cells. Seeds uniseriate or biseriate at fruit base, oblong or globular, sometimes winged.

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* From the Greek ateles — imperfect, incomplete, and antera — anther.

** Treatment by N.A.Bush.

† The name derives from Malcolm, London horticulturist.

†† Treatment by I.T.Vasil'chenko.

Cotyledons flat, embryo notorrhizal (in M. turkestanica, pleurorhizal). Hairs branched and simple, glandular hairs absent. — Annuals with simple leaves and often with markedly thickened pedicels.

A Mediterranean-Central Asian-Iranian genus.

The ancient genus Malcolmia has been treated critically in recent years. In the present account the following generic exclusions from Malcolmia have been accepted: 1) Maresia (established by Pomel in 1874) and 2) Torularia (established by Shult's in 1924).*

The genus Malcolmia is highly polymorphic, in all its groups. Apparently the species of M. are widely hybridized; to present a description of these hybrids without further observation, experimentation, and detailed study would be premature. In all such cases, the specific relationships of the hybrids must be individually determined.

Malcolmia species have modest ecological demands; they grow in solonchaks, solonetzes, in sandy, clayey and stony deserts and also on stony slopes of mountains and foothills, in gorges, river valleys, etc. Many of these species are encountered as weeds in cultivated fields. The seeds of all species of M. contain fatty oils; there is no doubt that these plants could
274 be successfully utilized to reclaim waste land. Though the name Wilckia (Scop. 1777) has the priority for this taxon, we prefer to conserve Malcolmia since it is widely used.

1. Petals 3—4 times longer than sepals . . . . 2.
+ Petals not more than twice as long as sepals . . . . 4.
2. Embryo pleurorhizal; cauline leaves entire, petioled . . . . 1. **M. turkestanica** Litv.
+ Embryo notorrhizal; cauline leaves sinuate-dentate or pinnatipartite . . . . 3.
3. Cauline leaves emarginate-dentate, oblong-ovate, sessile, siliques usually straight . . . . 6. **M. grandiflora** (Bge.) O. Kntze.
+ Cauline leaves pinnatipartite, oblong in contour, siliques usually curved in rings or spirals . . . . 7. **M. circinnata** (Bge.) Boiss.
4. Plant glabrous, leaves sessile, ovate, sagittate at base . . . . 12. **M. crenulata** (C. A. M.) Vass.
+ Plant pubescent (or glabrous) with leaves oblong, petioled . . . . 5.
5. Siliques flattened, with few remote seeds and empty constrictions between them, thickened along margin, beset with rigid spreading hairs (at least the lower) . . . . 3. **M. bucharica** Vass.
+ Siliques with typically arranged seeds, without conspicuous empty constrictions, more or less tetragonous or cylindrical . . . . 6.
6. Plant with coarse stout stems and rigid spreading hairs, leaves entire, large, oblong; siliques flattened-tetragonous, 40—60 mm long, 1.5—2 mm broad . . . . 2. **M. hispida** Litv.
+ Not as above . . . . 7.
7. Stigma acute . . . . 8.
+ Stigma fleshy, thickened, obtuse . . . . 10.
8. Siliques clavate-thickened at apex . . . 5. **M. trichocarpa** Boiss. et Buhse.
+ Siliques gradually tapering into an acute stigma . . . . 9.

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* Besides those we should point out the isolated position of the group Malcolmia, M. turkestanica Litw. (separated into the genus Fedtschenkoa Rgl. et Schmalh.) and M. crenulata (C.A.M.) Vass., possibly also deserving independent generic status.

9. Siliques straight, long (40—80 mm), on 2—3 mm long pedicels, tetragonous. Leaves more or less sinuate-dentate or entire . . . . 4. **M. africana** (L.) R. Br.
+ Siliques 30—40 mm long, on ca. 1 mm long pedicels, straight or twisted in somewhat closed rings. Leaves pinnatilobate or pinnatipartite . . . . 8. **M. karelini** Lipsky.
275 10. Petals bluish pink, 1—1.2 mm broad, siliques curved or twisted in circles or straight . . . . 11.
+ Petals white, slightly pinkish, narrow, ca. 0.6—0.8 (1) mm broad, siliques straight . . . . 11. **M. taraxacifolia** Balb.
11. Siliques long (30—70 mm), more or less curved or rolled in circles, recurved to the sides . . . . 9. **M. scorpioides** (Bge.) Boiss.
+ Siliques short, 20—30 (40) mm long, straight, erect, numerous . . . . 10. **M. multisiliqua** Vass.

Section 1. **TURKESTANICAE** Vass. — Plant with pleurorhizal embryo and entire oblong leaves.

1. **M. turkestanica** Litv., Schedae ad Herb. Fl. Ross. IV, (1900) No. 1005, p. 32. — Fedtschenkoa turkestanica Rgl. et Schmalh., Izv. O-va Lyub. Est., Antr. i Etn. XXXIV, 2 (1882) 9. — Malcolmia bungei Boiss. var. lasiocarpa Rgl. et var. macrantha Rgl. in Rgl. et Herd., Supplem. II, Bull. Soc. Imp. Nat. Mosc. I (1870) No. 95 p. p. — Exs.: HFR No. 1005.

Annual, 30—40 cm high, often branching from base, covered with branching and — especially in lower part — simple rigid long spreading hairs; leaves oblong or oblong-lanceolate, tapering into a petiole, entire, bilaterally pubescent (as the stem). Racemes dense, many-flowered; sepals oblong, ca. 4 mm long, with branching and simple hairs; petals 3—4 times as long as sepals, up to 15 mm long, linear-cuneate, dilated and rounded at apex, 2—2.5 mm broad, violet-pink, nearly purple; siliques linear, on 2—3 mm long pedicels, erect [straight ?], slightly curved, sharply torulose, flattened, pubescent (or rarely glabrous), 30—45 mm long, 1.2—1.5 mm broad, with acute stigma at apex, seeds short-elliptic, ca. 1.2 mm in size, narrowly winged at margin, dark brown, with pleurorhizal embryo. April—May. (Plate XVI, Figure 3).

Clayey steppes, slopes, river valleys, and sometimes as a weed. — Centr. Asia: Balkh., Mtn. Turkm., Syr D., Pam.-Al., T. Sh. Gen. distr.: Afghanistan. Described from Syr Darya. Type in Leningrad.

Section 2. **AFRICANAE** Vass. — Plant with notorrhizal embryo and more or less sinuate-dentate leaves.

2. **M. hispida** Litv. in Tr. Bot. Muz. 1 (1902) 37.

Annual, 20—30 cm high, with coarse whitish stout stem (up to 5—6 mm broad at lower part), branching from base, covered with long rigid spreading hairs mixed with some minute branching hairs; leaves large, oblong,
276 covered with rigid simple and branching hairs, long-petioled, with a thickened whitish midrib beneath, subentire or somewhat dentate; upper leaves smaller, sessile. Sepals narrowly oblong, 3.5—4 mm long, pubescent; petals bluish pink, 7—8 mm long, linear, ca. 0.8 mm broad, filiform at base,

dilated above; siliques straight, linear, flattened, subsessile on very short and thick pedicels, pubescent with branching and simple hairs, 40—60 mm long, 1.5—2 mm broad, with valves convex at seeds, tapering at apex into a short style with a small stigma. March—April.

Foothills. — Centr. Asia: Mtn. Turkm., Syr D., T. Sh. Described from the foothills of Kopet-Dagh, from the Ashkhabad District. Type in Leningrad.

Note. Occasionally an obliquely pleurorhizal embryo was observed in M. hispida and not a notorrhizal, as is usual in M.

3. **M. bucharica** Vass. in Addenda VII, p. 484.

Annual, 40—50 cm high, profusely branching from base, with numerous long ascending-erect branches; stem covered with spreading, rigid, simple hairs mixed with fewer minute bifid stalked hairs; leaves generally entire, the cauline oblong-lanceolate or oblong, remotely denticulate to subentire, short petioled to subsessile, generally covered with minute bifid hairs. Racemes loose, elongated; pedicels ca. 1 mm long; sepals oblong, covered with minute branching and simple hairs, 2—3 mm long; petals bluish pink, 4—6 mm long, linear-spatulate; siliques numerous, straight, flattened, ascending on short thickened pedicels ca. 2 mm long, strongly convex at the irregularly and remotely arranged seeds, 20—50 mm long, 1.2—1.8 (2) mm broad; lower siliques covered with rigid spreading hairs, the upper glabrous, all thickened along margin; valves often dark, blackish inside, with thin transverse nerves along surface; stigma obtuse, fleshy, slightly capitate; seeds elliptic, 1.2—1.5 mm long. March—April.

Saline clayey valleys. — Centr. Asia: Pam.-Al. Endemic. Described from Shirabad Valley (Uzbekistan), on wet, clayey, solonetzic soil near the kishlak [village] of Nau Shikhar. Type in Leningrad.

4. **M. africana** (L.) R. Br. in Ait., Hort. Kew. ed. 2, IV (1812) 121; DC., Prodr. I (1824) 187; Ldb., Fl. Ross. I (1842) 170; Boiss., Fl. Or. I (1867) 223 excl. var.; N. Busch, Fl. cauc. crit. III, 4 (1910) 634 excl. var.; Shmal'g., Fl. 279 Sr. i Yuzhn. Ross. I (1895) 61. — M. intermedia C. A. M., Verz. Pfl. Cauc. (1831) 186. — M. laxa DC., Syst. II (1821) 440. — M. stenopetala Bernh. Hort. Erf. (1832) ex Ldb., Fl. Ross. I (1842) 170. — Hesperis africana L., Sp. pl. (1753) 663. — Exs.: Al. Lehm. rel. bot. No. 92.

Perennial, with coarse stem branching from base, (5) 15—40 cm high, covered with branching and simple hairs or glabrous; leaves petioled, oblong (to ovate), more or less sinuate-dentate along margin. Sepals oblong, 4—6 mm long; petals bluish pink, linear-spatulate, dilated and rounded at summit, 8—10 (12) mm long, (0.5) 1.25—2 (2.5) mm broad; siliques more or less tetragonous, linear, straight, 40—70 (80) mm long, (0.8) 1.2—1.8 mm broad, covered with branching and fewer short simple hairs (transitional forms to M. trichocarpa Boiss. are pubescent with longer spreading and minute branched hairs), declinate to one side or ascending, numerous; stigma acute, elongated (usually shorter or as long as breadth of silique). March—April. (Plate XVI, Figure 4).

Foothill plains, stony slopes, river terraces, and sometimes as a weed in fields and waste lands, etc. — European part: Crim., Bl.; Caucasus:

(277)

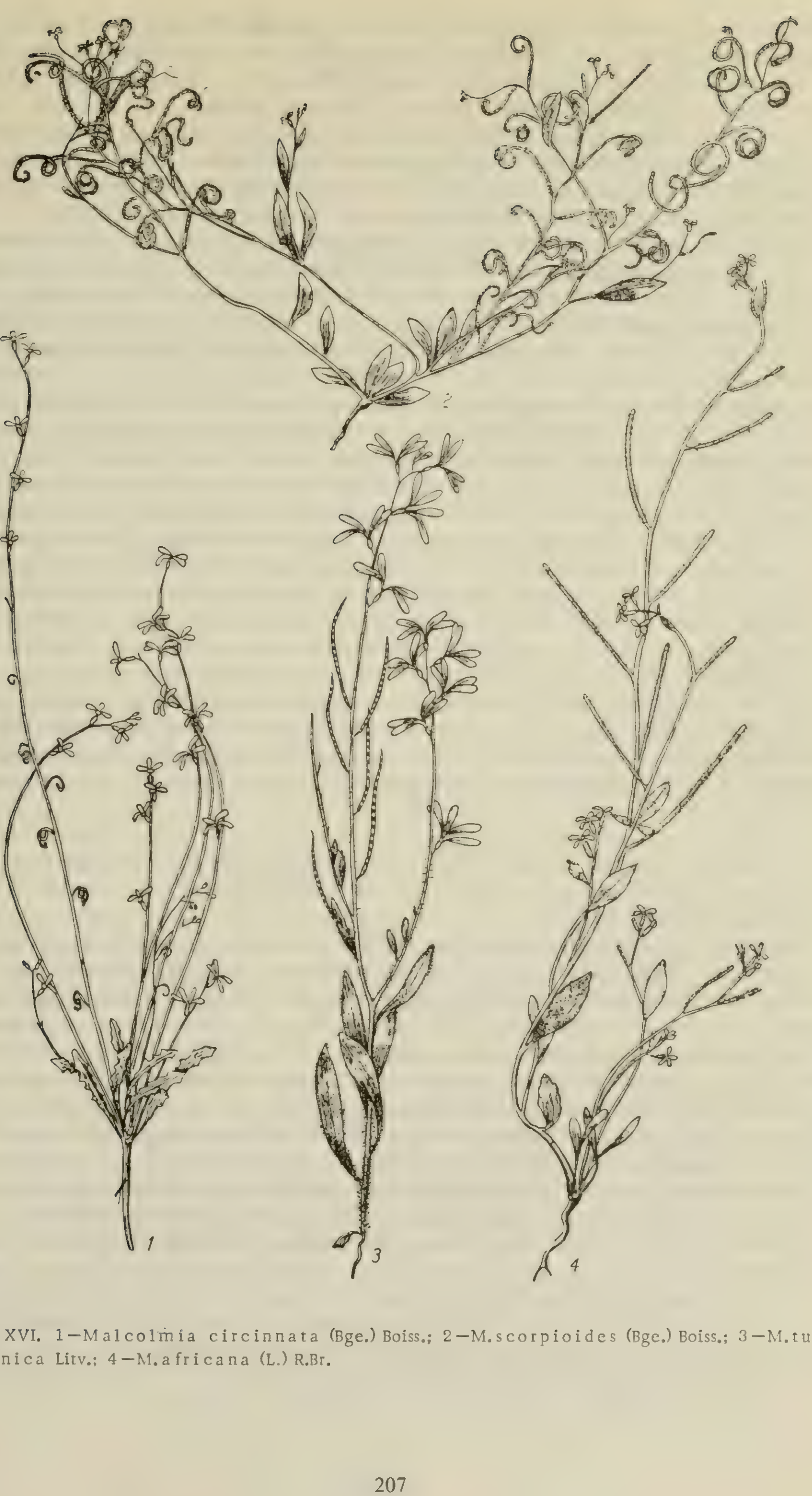

PLATE XVI. 1—Malcolmia circinnata (Bge.) Boiss.; 2—M. scorpioides (Bge.) Boiss.; 3—M. turkestanica Litv.; 4—M. africana (L.) R.Br.

Cisc., Dag., E. and S. Transc.; W. Siberia: Alt. (southern); Centr. Asia: Balkh., Mtn. Turk., Amu D., Syr D., Pam.-Al., T. Sh., Ar.-Casp. (Kara-Tau Range on Mangyshlak Peninsula). **Gen. distr.:** Med., Bal.-As. Min., Iran., Dzu.-Kash. Described from Algeria. Type in London.

Note. There are a number of varieties within the range of this species which are sometimes considered as separate species. Those are: 1) var. laxa Boiss. — M. laxa (Lam.) D. C. — with a divaricately branching glabrous stem; found in clayey plains and as a weed in hedges, in clay walls and roofs of houses, etc., in the Caucasus and the southern part of Central Asia; 2) var. intermedia Boiss. (M. intermedia C. A. M.) distinguished by having few glabrous siliques, shorter pedicels (than in the typical M. africana), and short acute stigma; found mostly as a weed in gardens, in irrigation ditches, in villages in Transcaucasia and the southern part of Central Asia; 3) var. stenopetala Claus (M. stenopetala Bernh.) with slender stem, minute petals 5—6 (8) mm long, 0.5—0.75 (1) mm broad and small siliques (20—40 mm long, 0.8—1 mm broad); grows in solonchaks within the distribution area of this species; 4) var. violacea Vass. characterized by violet stem and siliques, the latter sometimes thickened at apex; found along sandy riverbanks and as a weed among irrigated crops in Central Asia. This variety is probably of hybrid origin (M. trichocarpa Boiss. et Buhse × M. scorpioides (Bge.) (Boiss. or M. africana (L.) R. Br. × M. scorpioides (Bge.) Boiss.). A very interesting plant, found by Korzhinskii in Tadzhikistan, near Nizhni Kafirnigan, was distinguished
280 from M. africana (L.) R. Br. by its slender stem, tiny leaves, and dimorphous siliques, some of which were long and thin (20—40 mm long, ca. 0.75—1 mm broad) and some shorter and stouter (5—10 mm long, 1.5—1.8 mm broad) and truncate at apex. Scarcity of material and lack of ripe fruit make it impossible at this time to determine the proper systematic position of these plants in M.; tentatively, I regard them as M. africana (L.) R. Br. var. korshinskyi Vass.

5. **M. trichocarpa** Boiss. et Buhse, Aufzähl. (1860) 21. — M. africana (L.) R. Br. var. trichocarpa Boiss., Fl. Or. I (1867) 223; N. Busch in Fl. cauc. crit. III, 4 (1910) 635.

Annual, (10) 20—40 cm high, densely covered with minute branching and simple spreading hairs; leaves oblong, petioled, more or less sinuate-dentate to pinnatipartite. Sepals oblong or obovate, 4—6 (7) mm long; petals bluish pink, linear-spatulate, (7) 10—12 mm long, 1—2 mm broad; siliques thin-cylindrical, somewhat tetragonous, terete through entire length but abruptly clavately thickened at tip into a capitate 2-lobed point, densely covered with branching or rigid spreading long pale simple hairs, ascending or patent and often somewhat arcuate, 40—80 (100) mm long, 1.2—1.8 mm broad, ending in a very short acute stigma. April—May.

Mountainous areas: stony slopes, dry valleys, and sometimes as a weed in nonirrigated crops. — Centr. Asia: Mtn. Turkm., Amu D., Syr D., Pam.-Al., T. Sh. **Gen. distr.:** Iran. Described from northern Iran. Type in Leningrad.

6. **M. grandiflora** (Bge.) O. Ktze. in A. H. P. X (1887) 167; Boiss., Fl. Or. I (1867) 226. — Dontostemon grandiflorus Bge., Al. Lehm. rel. bot. in Arb. nat. Ver. zu Riga I (1848) No. 98.

Annual, with slender branching stem, 15—40 cm high, covered with long spreading simple and tiny branching hairs; lower leaves oblong, petioled, the cauline oblong-lanceolate or lanceolate, sessile, all more or less strongly sinuate-dentate. Racemes long, loose; pedicels ca. 2 mm long, in fruit 3—5 mm long; sepals oblong, pubescent, ca. 3 (4) mm long; petals linear, dilated gradually toward apex, 10—12 (20) mm long, 1.5—2 (2.5—5) mm broad, pink; siliques thin, long, straight or curved into apical rings, 30—50 (60) mm long, 0.6—0.8 (1) mm broad, wavy-convex (at seeds) and flattened, glabrous or covered with simple and branching hairs, ripe siliques lightly dehiscing; style short, with obtuse, rather capitate stigma; seeds small, elliptic, ca. 0.8—1 mm long. March—April.

Sands. — Centr. Asia: Kyz. K., Kara K., Amu D., Syr D. **Gen. distr.:** Iran. Described from Kyzyl-Kum. Type in Leningrad.

281 7. **M. circinnata** (Bge.) Boiss., Fl. Or. I (1867) 227. — Dontostemon circinnatus Bge. in Arb. d. naturf. Ver. zu Riga I (1848) No. 99. — Malcolmia karelini Lipsky, Mat. dlya fl. Sr. Azii, Act. Hort. Petrop. XXIII, I (1904) 31 pp. — Exs.: HFR No. 1402; Bunge, Al. Lehm. rel. bot. No. 94 sub Dontostemone circinnato Bge.

Biennial, subglabrous or with scattered branching and simple hairs; stem slender, branching from base, 10—30 (40) cm high; leaves mainly at lower part of plant oblong, pinnatipartite, with lanceolate lobes, sometimes also remotely denticulate, long-petioled; upper leaves few, entire, more or less sinuate-dentate. Racemes relatively loose; pedicels ca. 2 mm long, in fruit 1—2 mm long; sepals oblong, 2.5—3 (4) mm long; petals pink with dark violet nerves, 3 times as long as sepals, 8—10 (12) mm long, linear-spatulate, ca. 1—1.5 (2) mm broad; siliques linear, flattened, glabrous, lightly dehiscing when ripe, 30—40 mm long, ca. 1 mm broad, curved in spirals or rings (the upper sometimes straight); stigma acute. April—May. (Plate XVI, Figure 1).

Sands. — Centr. Asia: Kyz. K., Kara K., Balkh. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

8. **M. karelini** Lipsky, Mat. dlya Fl. Sr. Azii II (1904) 31 pp. — Dontostemon brevipes Bge., Al. Lehm. rel. bot. in Arb. nat. Ver. zu Riga I (1848) No. 100. — Sisymbrium brevipes Kar. et Kir., Enum. pl. Song. in Bull. Soc. Nat. Moscou (1842) 155, No. 1240 pp. — var. siliquis contortuplicatis.

Annual, 10—30 cm high, with slender stem branching from base, covered with scattered simple and branching hairs, or subglabrous; leaves oblong, deeply sinuate-dentate to pinnatipartite, lobes narrowly lanceolate, petioled. Flowers subsessile, in loose racemes; sepals 2—2.5 mm long; petals 4—5 mm long, 0.6—0.8 mm broad, narrowly linear-spatulate, pinkish; siliques 30—40 mm long, ca. 0.8 mm broad, contorted in spirals or straight, flattened from side of valves, more or less pubescent or glabrous, on short pedicels (ca. 1 mm long); stigma acute, short. March—April.

Sands. — Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Amu D., Syr D., T. Sh. **Gen. distr.:** Iran. Described from the Balkhash area, near the Sassyk-Pastau River. Type in Leningrad.

Note. In 1841 two plants were collected in the Balkhash area by Kirillov and Karelin. One plant (No. 106) was described by them as Sisymbrium brevipes Kar. et Kir., and the second (No. 1240) was referred to as a variety of that species. In the text (see Bull. Soc. Nat. 282 Moscou XV (1843) 154—155) the description states: "varietatem siliquis plerumque contortuplicatis et hispidis legimus prope fontem Sassykpastau." The authentic specimens (of these plants) are preserved in the herbarium of the Botanical Institute of the Academy of Sciences of the USSR.

In a monograph on the Cruciferae family, O. E. Shul'ts (l. c.) referred Sisymbrium brevipes Kar. et Kir. No. 106 (= Malcolmia brevipes Boiss., Fl. Or. I (1867) 227) to the genus Torularia and called it Torularia brevipes (Kar. et Kir.) O. E. Schulz. At the same time he indicated that Sisymbrium brevipes Kar. et Kir. var., l. c., 1240 should be referred to the genus Malcolmia (Malcolmia brevipes Boiss). However, this is not quite accurate since already Boissier had identified Sisymbrium brevipes Kar. et Kir. No. 106 with Malcolmia brevipes, i. e., Torularia brevipes (Kar. et Kir.) O. E. Schulz. In view of this situation, I am obliged to name Sisymbrium brevipes Kar. et Kir. var., l. c., No. 1240 as Malcolmia karelini Lipsky.

9. **M. scorpioides** (Bge.) Boiss., Fl. Or. I (1867) 225. — Dontostemon scorpioides Bge., Al. Lehm. rel. bot. in Arb. d. nat. Ver. zu Riga I (1848) No. 101. — Exs.: Al. Lehm. rel. bot., No. 101, sub Dontostemone scorpioide.

Annual, divaricately branching from base, usually with slender stems (5) 10—20 (40) cm high, covered with fine [branching ?] hairs and fewer simple hairs; leaves oblong, petioled, entire, sometimes (generally the upper) more or less dentate. Sepals oblong, with branched hairs, 3—4 mm long; petals 6—8 (10) mm long, bluish pink, narrowly linear, gradually dilated at tip up to (0.8) 1—1.2 (1.5) mm; siliques 30—50 (70) mm long, ca. 0.8—1 mm broad, wavy-convex at seeds, pubescent (or glabrescent), contorted in rings at tip or more or less straight, cylindrical, slightly tetragonous; fruiting pedicels thickened, 1.5—2 (3) mm long; stigma obtuse, fleshy, subsessile, slightly capitate or conical. April—May. (Plate XVI, Figure 2).

Saline clayey plains, river terraces, and sometimes as a weed. — Centr. Asia: Ar.-Casp., Balkh., Mtn. Turkm., Amu D., Syr D., T. Sh., Pam.-Al. **Gen. distr.:** Iran., Dzu.-Kash. Described from Amu Darya. Type in Leningrad.

Note. Var. curvata Fr. et Sint. (M. contortuplicata Boiss. var. curvata Fr. et Sint.) is distinguished within the range of this species by few flattened siliques and tall stem (30—40 cm). It was found as a weed in fields near Ashkhabad.

10. **M. multisiliqua** Vass. in Addenda VII, p. 484.

Annual, 8—30 cm high, with slender branching stem, covered with finely branching hairs; leaves small, oblong, entire or more or less sinuate-dentate, covered with hairs. Flowers bluish pink; sepals linear-lanceolate, 283 ca. 3 mm long; petals linear-spatulate, 6—7 mm long, ca. 0.8—1 mm broad; siliques numerous, straight, short (20—30 (40) mm long, ca. 1 mm broad), ascending, with obtuse fleshy stigma, thinner than siliques, densely covered with spreading and appressed hairs; pedicels 1—1.5 (1.75) mm long. Fl. July, Fr. August.

Stony solonetzic valleys. — Centr. Asia: Pam.-Al. Endemic (?); may be found in Afghanistan. Described from Shugnan (near the Bartang River). Type in Leningrad.

11. **M. taraxacifolia** Balb., Cat. hort. Taur. app. (1814) 10. — M. runcinata C. A. M., Verz. d. Pfl. Cauc. (1831) 186; Ldb., Fl. Ross. I (1842) 171; Boiss., Fl. Or. I (1867) 223; N. Busch, Fl. cauc. crit. III, 4 (1910) 638, pp.

Annual, 5—15 cm high, branches patulous, covered with finely branching and simple spreading hairs or subglabrous, grayish green; leaves oblong, more or less sinuate-dentate to pinnatilobate and pinnatipartite (the lower). Sepals oblong, 3—4 mm long; petals white, slightly bluish pink, 6—8 mm long, 0.8—1 mm broad; siliques tetragonous-cylindrical, with short spreading hairs (simple and branching) or subglabrous, bent to one side or even recurved and somewhat arcuately curved or straight, 30—60 mm long, 1.8—2 (2.5) mm broad at base, gradually tapering above or terete throughout entire length, with obtuse conical stigma at apex, irregularly gray-violet; fruiting pedicels very short (ca. 1 mm long), thinner than siliques. March—April.

Saline clayey valleys and dry stony slopes. — European part: L. V.; Caucasus: E. and S. Transc.; Centr. Asia: Ar.-Casp., Mtn. Turkm., Syr D., Amu D., Balkh., Pam.-Al. Endemic. Described from eastern Transcaucasia (Baku District). Type in Leningrad.

Note. A number of varieties within the range of this species is encountered in the distribution area of the species. Those are: 1) var. salina Vass., distinguished by its thin siliques (30—50 mm long, 1—1.2 mm broad), growing on very saline soils (along banks of salt lakes, on solonchaks, with Halocnemum, etc.); 2) var. brachycarpa Vass., with short siliques (15—20 mm long, ca. 2 mm broad at base, tapering above), known from Turgai District, where it was found on the banks of a small lake by I. M. Krasheninnikov in 1914); 3) var. crassa Vass., distinguished by stout cylindrical siliques, clavately thickened (or as if truncate) at tip; these varieties are distributed on solonetzic stony slopes and valleys. A typical M. runcinata C. A. M., in my opinion, has 30—60 mm long siliques gradually tapering above and broadening below to 1.8—2 (2.5) mm.

Section 3. **LAEVES** Vass. — Plant with glabrous stem and sagittate sessile leaves.

284 12. **M. crenulata** (C. A. M.) Vass., comb. nova. — Hesperis crenulata C.A.M., Verz. Pfl. Cauc. (1831) 187; Ldb., Fl. Ross. I (1842) 174. — M. meyeri Boiss., Ann. Sc. Nat. Bot. sér. 2, XVII (1842) 71 et Fl. Or. I (1867) 229; N. Busch, Fl. cauc. crit. III, 4 (1910) 644. — Exs.: Herb. Fl. Cauc. No. 319.

Annual, 10—25 cm high, with slender and usually branching stem, glabrous or scabrous with minute warts; leaves dark green, the radical oblong-obovate, tapering below into a short petiole, cauline leaves ovate or lanceolate, sessile, sagittate at base, entire or remotely denticulate. Racemes loose, few-flowered; pedicels 3—5 (8) mm long; sepals oblong-linear, violet, scarious along margin, 5—7 mm long; petals bluish pink, narrowly linear at base, dilated at upper part and slightly emarginate, 10—15 mm long, 3—4 mm broad; fruiting pedicels 5—10 mm long, nearly as thick as silique; siliques glabrous, 40—60 (70) mm long, 1—1.25 mm broad, sulcate below, straight or somewhat curved, tapering gradually toward apex, more or less shiny; style visibly distinct from silique, thinner than silique, ca. 2 mm long; septum thin, without alveolae. April.

Stony slopes and valleys, 1,200—1,500 m. — Caucasus: E. and S. Transc., Tal. **Gen. distr.:** Iran. Described from Talysh. Type in Leningrad.

Note. Somewhere in the rocky heights of Lenkoran, in 1931, N. V. Shipchinskii found a plant (fl. August 20) resembling the described species but differing in that its sepals were half as long and its pedicels shorter, in addition to several other distinctions. It is difficult to establish the precise specific relationship of this plant due to the absence of fruit.

Genus 613. **CRYPTOSPORA** * KAR. et KIR.**

Kar.et Kir., Enum.pl.in Bull.Soc.Nat.Mosc.XVI (1842) 161.

Sepals erect, not saccate. Petals small, white or pinkish. Filaments free, edenticulate. A crescent-shaped nectariferous gland on both sides of shorter stamens. Ovary sessile, style short, stigma shortly 2-lobed. Fruit a more or less bent falcate silique, indehiscent, breaking up into segments, constricted between seeds. Septum stout, wavy-curved, without fibrous veins, with numerous parallel dividing walls of epidermal cells. Seeds uniseriate, few, oblong, large (ca. 3 mm). Cotyledons flat, embryo notorrhizal. 285 Hairs usually branching. — Annual (?) branching plant covered with three kinds of hairs: 1) long rigid simple, 2) forked on stalks, and 3) forked on small rigid warts; leaves entire, oblong.

1. **C. falcata** Kar. et Kir., Enum. plant. in Bull. Soc. Nat. Mosc. XV (1842) 161; Fedch., Rast. Turkestana (1915) 466.

Annual, 10—40 cm high, with erect and usually branching stem, densely pubescent with short, branching and longer simple, spreading, rigid hairs; leaves oblong-lanceolate, sessile, entire (or with few small teeth), covered with branching hairs. Sepals lanceolate, pubescent, 2—3 mm long; petals white, linear-spatulate, emarginate, somewhat exceeding sepals, 3—5 mm long, 1—2 mm broad; siliques 15—35 mm long, 1.8—2.5 mm broad, rounded-cylindrical, gradually tapering above, torulose, falcate-recurved, densely covered with branching hairs (part of which on small acute reddish warts); valves rugose below; pedicels (2) 3—5 mm long, appressed to stem; stigma acute, slightly 2-lobed; seeds few, oblong, ca. 3 mm long, brown-reddish. April—May. (Plate XVII, Figure 3).

Clayey steppes and stony slopes. — Centr. Asia: Balkh., T. Sh., Syr D., Pam.-Al., Amu D., Mtn. Turkm. **Gen. distr.**: Dzu.-Kash. Described from the Balkhash area (near the Lepsa River). Type in Leningrad.

Genus 614. **MATTHIOLA** † R. BR.††

in Ait., Hort.Kew.ed.2, IV (1812) 119.

Sepals oblong or linear-lanceolate, gibbous-saccate at base. Petals pink, white, lilac, or dingy yellowish, tapering below, with a dilated (sometimes even suborbicular) limb. Siliques linear, dehiscent, with compact septum and flattened more or less oval, narrowly winged seeds, embryo pleurorhizal. Annuals, perennials or semishrubs with stellate (and sometimes even glandular) hairs.

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* From the Greek kryptos — hidden and spora — seed.

** Treatment by I.T.Vasil'chenko.

† After Peter Matthiolus (Pietro Andrea Mattioli), 1500—1577, physician and author of the well-known commentaries on Dioscorides.

†† Treatment by E.G.Chernyakovskaya. Manuscript revised by the editors.

1. Annuals . . . . 12.
+ Perennials . . . . 2.
2. Stems glabrous (or pubescent only at base), siliques glabrous or slightly hairy . . . . 3.
286 + Stems and siliques pubescent . . . . 6.
3. Leaves large and long, oblong, entire, siliques 5–7 mm broad, pedicels up to 20–25 mm long . . . . 1. **M. albicaulis** Boiss.
+ Leaves more or less sinuate-dentate, siliques narrower, pedicels shorter . . . . 4.
4. Siliques thickened, 3–4 mm broad, with thickened stigma at apex . . . . 4. **M. odoratissima** (Pall.) R. Br.
+ Siliques thinner and narrow, 2–2.5 (3) mm broad, with elongate stigma at apex . . . . 5.
5. Stems stout, cauline leaves sessile . . . . 8. **M. tatarica** (Pall.) DC. (see note to M. superba Conti).
+ Stems slender, cauline leaves petioled . . . . 5. **M. daghestanica** (Conti) N. Busch.
6. Fruiting pedicels tomentose, short and thickened (1.5–2 mm long). Siliques thickened, somewhat flattened, 3–4.5 mm broad. Radical and cauline leaves oblong, elongate . . . . 7. **M. robusta** Bge.
+ Characters not as above . . . . 7.
7. Leaves small, entire. Petals narrow (ca. 2 mm), involute at flowering. Stems slender. Siliques ca. 1.8–2 mm broad. Pamir-Alai . . . . 2. **M. integrifolia** Kom.
+ Leaves sinuate-dentate to pinnatipartite, if leaves entire then siliques broader than above . . . . 8.
8. Stigma elongate, narrower than breadth of silique, siliques 2–3 mm broad . . . . 9.
+ Stigma fleshy, capitate, as broad as silique or nearly so, siliques usually broader (3–4 mm broad) . . . . 10.
9. Petals 2.5–3 mm broad, fruiting pedicels 3–8 mm long (and to 12–18). European part and NW Kazakhstan . . . . . . 9. **M. fragrans** (Fisch.) Bge.
+ Petals 4–5 mm broad, fruiting pedicels 2–5 mm. NW Kazakhstan and West Siberia . . . . 10. **M. superba** Conti.
10. Cauline leaves ovate, sessile, furcately dentate. Fruiting pedicels 2–3 mm long . . . . 3. **M. runcinata** Bge.
289 + Cauline leaves elongate, petioled . . . . 11.
11. Radical leaves oblong-spatulate, obtuse, numerous, cauline leaves narrowly oblong to linear. Plant with appressed hairs. Kopet Dagh . . . . 6. **M. farinosa** Bge.
+ Radical and cauline leaves oblong or ovate. Plant woolly-tomentose. Crimea, Caucasus . . . . 4. **M. odoratissima** (Pall.) R. Br.
12. Stigma with 2 small acute horns at base, 3–8 mm long . . . . 14. **M. oxyceras** DC.
+ Stigma without small horns . . . . 13.
13. Stigma shortly 3-toothed, with 2 tubercles along sides. Flowers lilac or white . . . . 14.
+ Stigma conical, with elongated lobes, without tubercules. Flowers yellowish-greenish . . . . 11. **M. chenopodiifolia** C. A. M.
14. Fruiting pedicels 10–20 mm long . . . .★15. **M. incana** (L.) R. Br.
+ Fruiting pedicels shorter . . . . 15.

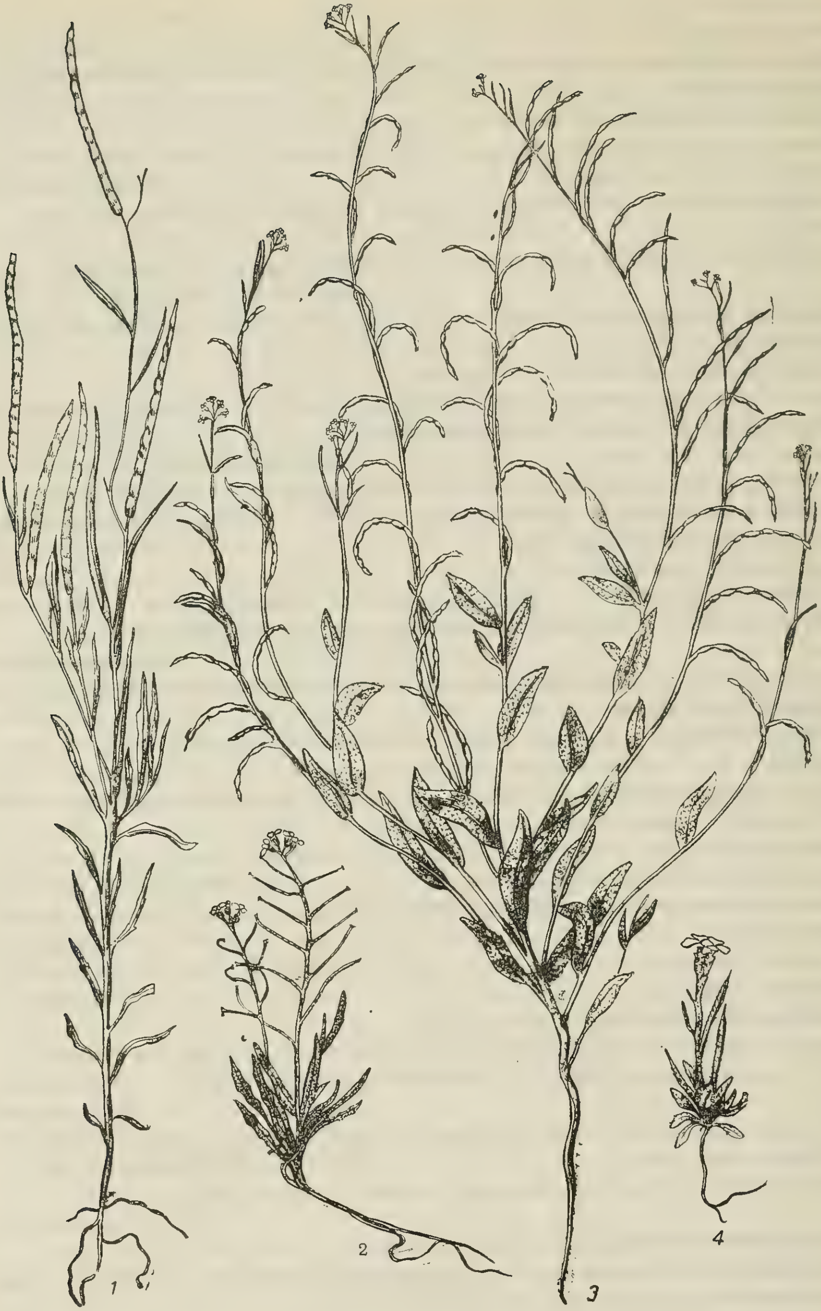

PLATE XVII. 1—Diptychocarpus strictus (DC.) Trautv.; 2—Sterigmostemum tomentosum (M.B.) DC.; 3—Cryptospora falcata Kar.et Kir.; 4—Clausia papillosa Vass.

15. Pedicels 4–5 mm long. Petals 18–25 mm long . . . 13. **M. stoddarti** Bge.
+ Pedicels 1–2 mm long. Petals 12–15 (18) mm long . . . . 12. **M. bucharica** Czerniak.

Series 1. **Perennes.** — Perennials.

1. **M. albicaulis** Boiss., Ann. Sc. nat. II sér. (1842) 14; B. Fedtsch., Conspect. I (1906) 30; Boiss., Fl. Or. I (1867) 147.

Perennial; stem stout, erect, simple, coarse; plant often bluish, glabrous, up to 50–70 cm high; leaves large, oblong, the radical numerous, long, with broad winged petioles, cauline leaves narrower, fewer, covered with stellate hairs (at apex with few glands). Sepals woolly-hairy, usually violet, 11–12 mm long; petals 20–25 mm long, 3–4 mm broad, acutish, violet; siliques glabrous, tapering above, 8–10 mm long, 5–7 mm broad, flattened, with elongated style at apex and stigma with long folded lobes; fruiting pedicels 20–25 mm long, obliquely declinate, glandular, woolly at apex; seeds broadly marginate, large (up to 5 mm in size). May.

Stony slopes. — Centr. Asia: Mtn. Turkm., Pam.-Al. **Gen. distr.:** Iran. Described from Iran. Type in Geneva.

Note. Specimens of this species from Pamir-Alai are distinguished
290 by the oblong-obovate leaves with sessile fleshy stigma and by the absence of woolly pubescence on pedicels (collected by Korzhinskii in the Trans-Alai Range at an altitude of 3,000 m). After more material of these forms from the Pamir-Alai is collected, it will probably be necessary to separate them into a special species; for the time being we name it M. alaica Czerniak.

2. **M. integrifolia** Kom., Mat., Fl. Turk. nagoriya in Tr. SPb. O-va Est. XXVI (1896) 85. — M. flavida auct. Fl. turk., non Boiss.

Perennial undershrub up to 30 cm high, covered with simple and stellate hairs, slender, usually many-stemmed; leaves oblong, small, the radical entire or slightly dentate, cauline leaves entire (seldom denticulate). Sepals pubescent, ca. 10 mm long; petals yellow, slightly dingy grayish-brownish, 20–25 (27) mm long, ca. 2 mm broad, inrolled at flowering; siliques 6–9 (12) mm long, 1.8–2 (2.5) mm broad, pubescent, on 2–3 mm long pedicels, stigma short, capitate, narrower than breadth of silique; seeds oval, up to 2–3 mm long, ca. 1.25–1.5 mm broad. June–July.

Stony slopes and valleys up to 2,500–3,000 m. — Centr. Asia: Pam.-Al. Described from Pamir-Alai, from the village of Peti on the Fon River. Endemic. Type in Leningrad.

3. **M. runcinata** Rgl., Suppl. II ad Enum. pl. Semen. No. 66 in Bull. Soc. Nat. Mosc. (1874) 254; B. Fedtsch., Consp. I (1906) 32. — M. adenophora Czerniak. in herb. — M. leprosa Nevsky in Acta Inst. bot. Ac. Sc. URSS. Ser. 1, IV (1937) 301.

Perennial, usually many-stemmed, tomentose-stellate, often mixed with glandular hairs; cauline leaves ovate (or oblong, small), short, more or less sinuate-dentate (often at upper part of blade), many, lower leaves petioled, sometimes more deeply emarginate to pinnatipartite, upper leaves sessile. Sepals white-tomentose, stellate-pubescent, or with glandular hairs, 10–12 mm long; petals grayish violet, ca. 18–20 (25) mm long, 2.5–3 mm broad; siliques 50–100 mm long, 2.5–3 mm broad, 2–3 mm long pedicels, with stellate and sometimes glandular hairs, stigma fleshy, shortly 2-lobed; seeds broadly oval, up to 3 mm long, 2–2.5 mm broad, narrowly winged. April–May.

Stony valleys and slopes. — Centr. Asia: Syr D., Pam.-Al. Endemic. Described from Syr Darya, Leninabad District (near Khodzhent). Type in Leningrad.

Note. Very possibly M. obovata Bge. (Arb. Naturf. Ver. Riga I (1847) 193) is the proper name for this taxon, but in view of the lack of authentic material, it is difficult to determine what it actually represents. For this reason we retain the name M. runcinata Rgl. Within the range of the
291 latter species, var. leprosa Nevsky (pro sp. in Trud. Bot. Inst., ser. 1, 4 (1937) 301) is worthy of notice; it is distinguished by a profusely glandular pubescence.

4. **M. odoratissima** (Pall.) R. Br. in Ait. Hort. Kew. ed. 2, IV (1812) 120; Ldb., Fl. Ross. I (1842) 109; Boiss., Fl. Or. I (1867) 149; Conti, Genre Matthiola (1900) 46; N. Busch, Fl. cauc. crit. III, 4 (1910) 669; Shmal'g., Fl. I (1895) 59 (excl. var. b and c). — Cheiranthus odoratissimus Pall., Ind. taur. (1796) 113 nom.; M. B., Casp. (1800) 116. — Exs.: Herb. Fl. Cauc. No. 220.

Perennial, small undershrub, woolly (to tomentose)-pubescent, or stem and siliques glabrous and only leaves pubescent, 20–75 cm high; radical leaves oblong or ovate, entire or more or less sinuate-dentate to pinnatipartite, cauline leaves smaller. Sepals oblong, 10–15 mm long; leaves dingy yellowish, 20–30 mm long, 3–5 mm broad; siliques linear, thickened, flattened, about 10–15 mm long, 3–4 mm broad, pubescent or glabrous, with fleshy stigma; pedicels thickened, 3–5 (8) mm long. April–June.

Clayey and calcareous slopes. — European part: Crim.; Caucasus: Cisc., Dag., E. Transc. **Gen. distr.:** Iran. Described from the Crimea. Type in Leningrad.

Note. The species varies considerably in all its parts, particularly in shape and degree of laciniation of leaves, size of flowers, and pubescence. A series of forms, some of which are considered as separate species, is distinguished within the range of this species: 1) oblongifolia Czerniak., leaves entire; 2) pinnatisecta N. Busch, leaves pinnatisect; 3) caspica N. Busch, stem glabrous (or pubescent below), siliques glabrous, pedicels sparsely pilose; 4) taurica Conti, densely white-pubescent plant, with pinnatipartite leaves; 5) leiocarpa N. Busch, with pubescent stem and glabrous siliques; 6) ossetica N. Busch, close to caspica but differing by its tomentose-pubescent fruiting pedicels; 7) dentata Boiss.. with sinuate-dentate cauline leaves and pinnatipartite lower and other leaves. Some authors (Voronov) regard these types as deviated extreme forms.

5. **M. daghestanica** (Conti) N. Busch, Fl. cauc. crit. III, 4 (1900) 676. — M. fragrans ssp. daghestanica Conti, Genre Matthiola (1910) 45. — Exs.: Herb. Fl. Cauc. No. 369.

Perennial, 25–60 cm high, with slender glabrous stems (or pubescent only below). Radical and lower cauline leaves many, oblong, more or less sinuate-dentate to pinnatipartite, densely pubescent (to tomentose).

Sepals ca. 10 mm long; petals 20—25 mm long, 2—3 mm broad, narrowly oblong, dingy yellowish, slightly violet; siliques linear, flattened, 10—15 cm long, 292
2—2.5 (3) mm broad, glabrous or slightly hairy, tapering at apex into a fleshy stigma narrower than silique; seeds broadly oval, 3 mm long, 2 mm broad. May.

Calcareous, dry clayey and stony slopes. — Caucasus: Dag. Endemic. Described from Dagestan. Type in Leningrad.

6. **M. farinosa** Bge. in Boiss., Fl. Or. I (1867) 150. — M. revoluta var. farinosa Conti, Genre Matthiola (1900) 21. — Exs.: Sint. Iter trans. pers. 1900—1901 No. 1691.

Perennial, 15—30 cm high, usually many-stemmed, subfruticose at base, densely gray-pubescent with stellate appressed hairs sometimes mixed with glandular ones; radical leaves oblong-spatulate, obtuse at apex, many, small, tapering into a petiole; cauline leaves linear or narrowly oblong, sinuate-entire, more or less dentate to pinnatipartite. Sepals linear-lanceolate, densely pubescent, 10—12 mm long; petals linear, oblong at upper part, undulant along margin, about 25—30 mm long, 3.5—5 mm broad; siliques usually pubescent, sometimes glandular, about (8)—10—15 mm long, 3—4 mm broad, with fleshy, capitate, 2-lobed stigma; pedicels pubescent, thickened, 3—5 (7) mm long; seeds oval, 3—4 mm long, 2.5 mm broad, winged. March—April. (Plate XVIII, Figure 2).

Stony plains and slopes. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** Iran. Described from northern Iran. Type in Geneva.

Note. A polymorphic species; within its range, var. glandulifera Czerniak. is distinguished by its densely glandular pubescence (eastern Kopet Dagh), as well as a series of forms differing in degree of laciniation of leaves, size of flowers, and other characters. To determine more precisely the taxonomic position of these forms, a more comprehensive study must be done, in particular, at their natural habitats. Some of them may be regarded as microspecies.

7. **M. robusta** Bge., Arb. Naturf. Ver. Riga I (1847) 137; Boiss., Fl. Or. I (1867) 149; Conti, Genre Matthiola (1900) 25—26. — Exs.: Al. Lehm., rel. bot. No. 60.

Perennial undershrub 15—30 cm high, with coarse stem densely appressed-hairy; radical leaves (and lower cauline) petioled, oblong, more or less sinuate-dentate to pinnatipartite, upper leaves ovate, sessile, sinuate or incised-dentate, densely pubescent. Sepals 10 mm long, pubescent; petals greenish yellow, 20—25 mm long, ca. 3—4 mm broad; siliques pubescent, thick, somewhat flattened, 50—100 mm long, 3—4.5 mm broad, with fleshy stigma narrower than silique; pedicels thickened and short, 1.5—2 (2.5) mm long; seeds oval, ca. 2 mm long. May—June. 293

Slopes (particularly calcareous) near the banks of the Caspian Sea. — Centr. Asia: Ar.-Casp. (Ust-Urt, Mangyshlak); Caucasus: E. Transc. Endemic. Described from the eastern banks of the Caspian Sea (Airakli Range). Type in Leningrad.

Note. Transitions from this species to M. fragrans Bge. occur in nature.

8. **M. tatarica** (Pall.) DC., Syst. II (1821) 170; Ldb., Fl. Ross. I (1842) 109; Boiss., Fl. Or. I (1867) 150; Conti, Genre Matthiola (1900) 24. — Hesperis tatarica Pall., Reis. II (1773) 406, 413, 497; III (1776) 314, 326. — M. odoratissima b. tatarica Schmalh., Fl. I (1895) 59. — Ic.: Pall., l. c., tab. L, f. 1, 2.

Perennial; stem erect, stout, glabrous (sometimes pubescent at lower part), 25—50 (100) cm high; leaves large, irregularly deeply sinuate-dentate to pinnatipartite, more or less densely covered with appressed stellate or tomentose hairs, sometimes slightly hairy, green (var. viridis Czerniak.), lower leaves oblong, petioled, the upper shorter, sessile. Sepals 10—12 mm long, lanceolate-linear; petals 20—25 (30) mm long, 3—5 mm broad, yellowish or slightly violet; siliques glabrous, 7—10 cm long, 2.5—3 mm broad, strict above, with a 2-lobed stigma narrower than breadth of silique, pedicels glabrous, ca. 2—3 (4) mm long; seeds oval. May—June.

Slopes (particularly calcareous) and steppes. — European part: L. V.; W. Siberia: U. Tob.; Centr. Asia: Ar.-Casp. Endemic. Described from the Aral-Caspian area (Inder Mountains). Type in Leningrad.

Note. M. tatarica DC. is one of the polymorphic species in Matthiola. When more material is available for study, a series of local species might be recognized within the range of this one.

9. **M. fragrans** Bge., Del. Sem. Hort. Dorp. 1839; Ldb., Fl. Ross. I (1842) 110; Conti, Genre Matthiola (1900) 43; Voronov, Fl. Yugo-Vost. V (1931) 458. — M. odoratissima R. Br. c. fragrans Schmalh., Fl. I (1895) 59. — M. odoratissima var. tanaicensis DC., Syst. II (1821) 170 et Prodr. I (1824) 134. — Cheiranthus fragrans Fisch., Cat. h. Gor. (1812) 134. — Ic.: Voronov, l. c.

Perennial, simple or branching stem (or many-stemmed), whitish woolly-tomentose, 20—50 cm high; leaves oblong, the lower numerous, long, long-petioled, more or less sinuate-dentate (sometimes subentire) to pinnatipartite, the upper smaller, sessile, densely (to tomentose) covered with stellate appressed hairs. Sepals oblong, 10—12 mm long; petals
294 dingy yellowish-grayish brown, 20—25 mm long, ca. 2.5—3 mm broad; siliques flattened ascending-erect, pubescent, 7.5—11 cm long, 2.5—3 mm broad; stigma elongate, conical, narrower than silique; pedicels slender, 3—8 mm long (in var. longipedicellata Czerniak. — distributed mainly to the west of the Volga River — to 12—18 mm); seeds suborbicular. Fl. May.

Calcareous outcrops and slopes. — European part: M. Dnp., V.-Don, L. Don, L. V.; Centr. Asia: Ar.-Casp.; W. Siberia: U. Tob. Described from the Lower Don area. Type in Leningrad.

10. **M. superba** Conti, Genre Matth. in Mém. Herb. Boiss. (1900) 23. — M. songarica Conti, l. c. — M. odoratissima Kryl., Fl. Zap. Sib. VI (1931) 1384, non R. Br.; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 610. — Ic.: N. Busch, l. c., 611.

Perennial; stems one or few, simple, pubescent, leafy, 25—60 cm high; leaves oblong, densely covered with stellate hairs, irregularly sinuate-dentate or incised-dentate, radical leaves even pinnatipartite, with acute lanceolate lobes, broad and long-pedicelled (often subsessile); sepals pubescent, 10—12 mm long, narrowly oblong; petals about 20—25 (27) mm long, yellowish-grayish brown, ca. 4—5 mm broad; siliques ascending-erect,

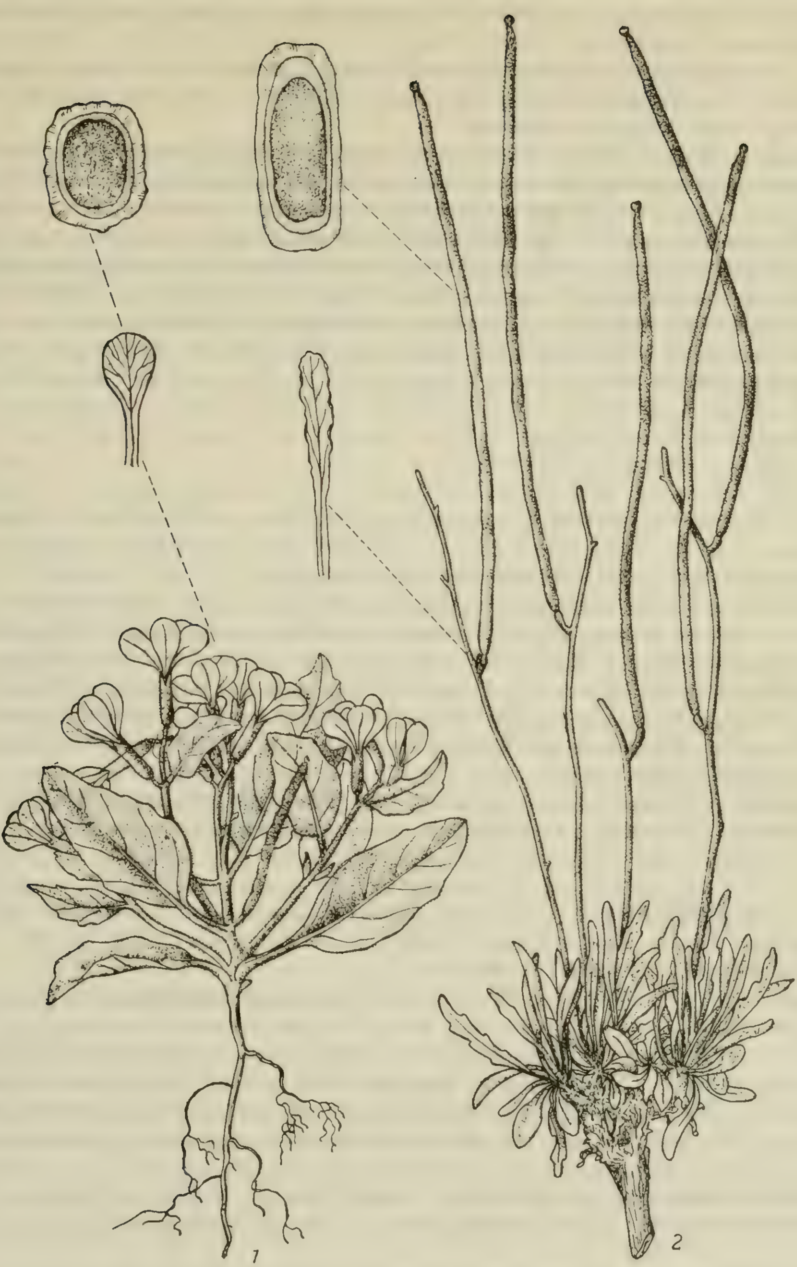

PLATE XVIII. 1—Matthiola stoddartii Bge., plant with flowers, petals, and seed; 2—M. farinosa Bge., plant with fruit, petals, and seed.

pubescent, about 7–10 mm long, ca. 2.5–3 mm broad, on 2–5 mm long pedicels, with thickened stigma; narrower than breadth of silique; seeds short and broadly oval, 3 mm long. May–June.

Rocky slopes and steppes. — Central Asia: Balkh., Ar.-Casp.; West Siberia: Irt.; East Siberia: Ang.-Say. Endemic. Described from the Balkhash area. Type in Geneva.

Note. Certain plants within this species have glabrous stems and fruit and slightly pubescent leaves; I consider those transitional to M. tatarica. Conti (l. c.) has already indicated the relationship between both species.

In the eastern part of the distribution area (Angara-Sayans area) there is an isolated variety, distinguished by its pubescence turning glabrescent at fruiting, its elongated large leaves, and other characters. Further study of more material of this variety may necessitate its separation into a special species — M. sibirica Czerniak.; as yet it is impossible to give a complete description.

Series 2. Annuae — Annuals.

11. **M. chenopodiifolia** Fisch. et Mey., Ind. Sem. H. P. (1835) 33; Ldb., Fl. Ross. I (1842) 110; Boiss., Fl. Or. I (1867) 153; B. Fedtsch., Consp. I (1906) 32; Conti, Genre Matthiola (1900) 78–79.

297 Annual, 5–30 cm high, with stellate appressed hairs, stems slender; leaves ovate or oblong, slightly sinuate-dentate to subentire. Sepals linear, stellate-pubescent; petals yellowish-greenish, narrow and long, linear, about 25–30 mm long, ca. 1.5–2.5 mm broad; siliques linear, 7–10 mm long, 2 mm broad, stellate-hairy (and sometimes with glandular hairs), often arcuate, on 4–5 mm long pedicels, stigma conical with elongated lobes; seeds oval, ca. 2 mm long.

Deserts. — Centr. Asia: Ar.-Casp., Kyz. K., Kara K., Mtn. Turkm. (Balkhany). Endemic. Described from Turkmenia, from the eastern banks of the Caspian Sea. Type in Leningrad.

12. **M. stoddartii** Bge. in Mém. pres. a l'Acad. d. Sc. S. Pétersb. VII (1851) 51; Boiss., Fl. Or. I (1867) 154; Conti, Genre Matthiola (1900) 79–80; O. et B. Fedtsch., Consp. I (1906) 33.

Annual, 4–10 cm high, with simple or usually branching stem, densely stellate-pubescent; leaves oblong, more or less dentate to subentire. Sepals 7–8 mm long, oblong, pubescent; petals lilac (yellowish at the onset), narrowly clawed, 12–15 (18) mm long and limb 3–4 (5) mm broad; siliques 30–45 mm long, ca. 2–3 mm broad, stigma fleshy, with 2 small tubercles at base, stellate-hairy; pedicels short, thickened, 1–2 mm long; seeds oval. May.

Saline clayey plains and sands. — Centr. Asia: Ar.-Casp., Balkh. Described from the Aral-Caspian area. Type in Leningrad.

13. **M. bucharica** Czerniak. sp. nova in Addenda VII, p. 485.

Annual, 3–10 cm high, branching nearly from base, stellate-pubescent (and with sparse glandular hairs); leaves ovate, dentate to subentire. Sepals 8–10 mm long, pubescent; petals lilac, 18–25 mm long, 5–8 mm broad, linear below, with broad suborbicular limb; siliques 40–60 mm long, 2–3 mm broad, densely stellate-pubescent, sometimes beset with glandular hairs (var. glandulosa (Lipsky) Czerniak.) and long hairs branched at tip (var. papillosa (Lipsky) Czerniak.). Fruiting pedicels 4—5 mm long. March—April. (Plate XVII, Figure 1).

Clayey plains. — Centr. Asia: Pam.-Al. (southern valleys), Amu D., Kyz. K., Syr D. Described from Syr Darya. Type in Leningrad.

14. **M. oxyceras** DC., Syst. II (1821) 173; Prodr. I (1824) 134; Boiss., Fl. Or. I (1867) 155; Conti, Genre Matthiola (1900) 61; N. Busch, Fl. cauc. crit. III, 4 (1910) 677. — M. longipetala Ldb., Fl. Ross. I (1842) 110. — Ic.: Deless., Ic. sel. II (1823) tab. 11. — Exs.: Kotschy, Pl. Pers. austr. No. 176. 298

Annual or biennial (?), with slender stem, stellate-pubescent (mixed with glandular hairs), 20—40 cm high; leaves narrowly oblong, sinuate-dentate (to pinnatipartite). Sepals ca. 10 mm long, covered with appressed stellate hairs; petals linear, dilated above, ca. 20—23 mm long, 2—4 mm broad, dingy yellowish; siliques cylindrical, slightly torulose, 5—10 mm long, ca. 1.75—2 mm broad, stellate-pubescent (usually mixed with glandular hairs), stigma with 2 small subulate and acute 3—8 mm long horns at base; seeds oval. May.

Steppes. — European part: Bl., Crim. **Gen. distr.:** W. Med., As. Min. Described from Asia Minor. Type in Geneva.

★15. **M. incana** R. Br. in Ait. Hort. Kew. ed. II, 10, IV (1812) 119; Boiss., Fl. Or. I (1867) 148. — M. annua Sweet, Hort. Saburb. Lond. (1818) 147; DC., Prodr. I (1824) 133; Shmal'g., Fl. Sr. i Yuzh. Ross. I (1895) 59.

Annual, 30—50 cm high, slender, grayish-tomentose, with branching (mixed with glandular) hairs and erect branching stem, sometimes glabrous; leaves oblong, obtuse at apex, entire. Sepals oblong-linear, densely pubescent, 10—12 mm long; petals red (or white), 20—30 mm long, about 10—15 mm broad, tapering below, with broad suborbicular limb, fragrant, often doubled; siliques flattened-cylindrical, tomentose, about 60—80 mm long, the upper erect on 10—20 mm long densely pubescent pedicels, stigma lobes dorsally covered with tubercles.

Cultivated as an ornamental plant, native to southern Europe.

Genus 615. **MICROSTIGMA*** TRAUTV.**

Pl. Imag. (1844) 36.

Sepals oblong, erect, the lateral saccate. Petals white. Stigma not thickened dorsally. Siliques short, 18—20 mm long, recurved below. Valves flat, adnate with septum at apex, dehiscent at base. Seeds large, membranous-marginate, globular, flattened, with pleurorhizal embryo. — Perennial, with erect stem, entire leaves, branching and glandular hairs.

Monotypic genus from Altai.

1. **M. deflexum** (Bge.) Juz. comb. nova. — M. bungei Trautv., Pl. Imag. I (1844) 36. — Matthiola deflexa Bge., Del. Sem. H. Dorpat. (1839); Ldb., Fl. Ross. I (1842) 110; Kryl., Fl. Alt. (1901) 63 and Fl. Zap. Sib. VI (1931) 1383; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 612. — Ic.: Trautv., l. c.; N. Busch, l. c., 613 et tab. geogr. 614. 299

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* After the Greek mikros—small and stigma—stigma.

** Treatment by E.G.Chernyakovskaya.

Perennial, to 60 cm high, stellate, mixed with glandular hairs; stem erect; lower leaves oblong, subentire, the cauline sinuate-dentate, with remote acute teeth. Sepals 9—11 mm long, tomentose, narrowly membranous at apex; petals ca. 20 mm long; siliques oblong, short, 18—20 mm long, 5—6 mm broad, compressed (dorsally), with thickened margins and an erect beak ca. 2 mm long, tomentose- and glandular-hairy, recurved below; pedicels short, bent, retrorse, 3—4 mm long; valves flat, adnate with septum at apex, dehiscent below, with thin membranous veinless septum; cotyledons filiform at base, broadening toward apex; seeds 4—4.5 mm in size. June—July.

Dry stony slopes. — W. Siberia: Alt. Endemic. Described from Altai. Type (grown from seeds imported from the Chuya River district) in Leningrad.

Genus 616. **TETRACME*** BGE.**

Bge. in Delect. sem. Horti Dorpat. (1836) 7.

Sepals declinate, not saccate. Petals short-clawed, whitish. Filaments free, edenticulate. A small, short-pyramidal nectariferous gland on both sides of shorter stamens. Ovary sessile, stigma subsessile, 2-lobed. Two short basal prickles on both sides of stigma, persistent, either short and coarse or thin, long, and awnlike. Fruit a terete silique, straight or curved, slightly tetragonous, 4-horned, bivalvular below apex, valves convex, 3-nerved, lateral nerves leading into horns. Septum thin, with a fibrous strand and many parallel membranous dividing walls of epidermal cells. Seeds uniseriate, slightly flattened, immarginate. Cotyledons flat, embryo notorrhizal. Densely pubescent with stellate hairs often mixed with spreading simple and furcate hairs. — Low annuals with stem divaricately branching from base.

1. Siliques with short (1—2 mm), small strict prickles at apex . . . . 2.
+ Siliques with long (2.5—5 mm), thin awns at apex, recurved or bent to one side . . . . 3. **T. recurvata** Bge.
300 2. Siliques 6—8 mm long, more or less arcuate . . . . 1. **T. quadricornis** Bge.
+ Siliques 10—13 mm long, straight . . . . 2. **T. pamirica** Vass.

1. **T. quadricornis** (Steph.) Bge., l. c.; Bge. in Arb. naturf. Ver. zu Riga, I (1848) 158; Ldb., Fl. Ross. I, 194, 762; Boiss., Fl. Or. I (1867) 316; Shmal'g., Fl. I, 75. — Erysimum quadricorne Steph. in Willd., Sp. Pl. III (1800) 514. — Exs.: Al. Lehm., rel. bot. No. 121.

Annual, 5—20 cm high, branching from base, densely pubescent, with small stellate hairs; leaves tiny, narrow, oblong-linear, entire or more or less dentate. Flowers minute; sepals ovate, ca. 0.8—1 mm long; petals whitish, linear-spatulate, hardly exceeding sepals; siliques linear, compressed-tetragonous, 6—8 mm long, ca. 1—1.5 mm broad, torulose, pedicel and lower part appressed to stem, the upper part arcuately recurved, broadening at base (in plane perpendicular to valves), densely pubescent with stellate and sometimes long, rigid, simple hairs; with 4 short divergent spines ("horns") at apex ca. (1) 1.5–2 (2.5) mm long and a small capitate stigma on an inconspicuous projection in between; seeds yellow, ellipsoid, ca. 1 mm long, 0.5 mm broad; fruiting pedicels short (1–1.5 mm), thickened, clavately broadened toward apex. April–May. (Plate XIX, Figure 5).

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* From the Greek tetra — four and akme — point.

** Treatment by I. T. Vasil'chenko.

Saline clayey and rocky steppes and terraces, sometimes as a weed. — European part: L. V.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Kara K., Amu D. Syr D., Pam.-Al., T. Sh. Gen. distr.: Dzungaria-Kashgar area. Described from Kyzyl-Kum. Type in Leningrad.

2. **T. pamirica** Vass. in Addenda VII, p. 485.

Annual, 20–50 cm high, branching from base, with long ascending-erect branches, covered with small stellate hairs; leaves oblong, entire or with remote teeth. Flowers small, whitish; sepals ovate, broad, ca. 0.8–1 mm long; petals hardly exceeding sepals; siliques 10–13 mm long, ca. 1.5 mm broad, linear, straight, appressed (in entire length) to stem or the upper part slightly declinate, with 4 horns at apex ca. 1 mm long and a small inconspicuous stigma; fruiting pedicels thickened, ca. 1 mm long, clavately broadening toward tip; fruiting raceme loose, developed almost from base of stem and branches; seeds ellipsoid, ca. 1–2 mm long, grayish-yellowish, with dark green spots. (Plate XVIII, Figure 4).

Stony slopes up to 2,500 m. — Centr. Asia: Pam.-Al. Endemic.
301 Described from Pamir-Alai, from Shugnan, Garan District, near the Pyandzh River between the Kazedag and Kambedag rivers, where it was collected on 1 August 1901, by Alekseenko. Type in Leningrad.

3. **T. recurvata** Bge. in Arb. naturf. Ver. zu Riga, I (1848) 158; Boiss., Fl. Or. I (1867) 317. — Exs.: Al. Lehm., rel. bot., No. 122; HFR No. 1403.

Annual, 5–20 cm high, with slender stem branching from base, densely covered with fine, stellate hairs; leaves oblong, pinnatipartite, with short lanceolate lobes. Sepals ovate, ca. 0.8–1 mm; petals whitish, somewhat longer than sepals, linear-spatulate; siliques linear, compressed-tetragonous, 7–8 mm long, 1–1.5 mm broad, more or less recurved or even bent into a ring, with dense, fine stellate hairs, ending with 4 thin awns ca. 2.5–3.5 mm long, and a triangular-conical compressed apex, 1–1.5–2.5 mm long, bearing the stigma, declined horizontally or recurved; fruiting pedicels clavately broadened, thickened toward tip, 1–1.5 mm long; seeds oblong, ca. 1.2 mm long, ca. 0.5 mm broad, grayish-yellowish, cotyledons green along margin. March–April.

Sands. — Centr. Asia: Balkh., Kyz. K., Kara K., Amu D., Syr D., Pam.-Al., T. Sh. **Gen. distr.**: Iran., Dzu.-Kash. Described from Kyzyl-Kum. Type in Leningrad.

Note. The following two varieties meet within the range of this species: 1) var. denticulata Vass., with small, prickly-toothed fruit ribs (plants of this variety were collected near the city of Leninabad (Khodzent) in the area of the Kara Tepe height), and 2) var. termesica Vass., with thin unthickened fruit pedicels (collected near the city of Termez).

Genus 617. **TETRACMIDION*** KORSH.**

Korsh.in Bull.Acad.St.-Pétersb.V, sér.IX (1898) 421; Hayek, Crucif.-Syst.(1911) 229.

Sepals divergent, not saccate. Petals pale yellow. Filaments edenticulate, free, slightly dilated at base. Ovary oval, unilocular, with 4 pendulous ovules. Stigma entire. Fruit oblong, tetragonous, coriaceous, indehiscent, unilocular, usually 1-seeded, with 4 short horns at apex. Embryo notorrhizal. — Annual, densely pubescent with stellate hairs, leaves entire.

Monotypic genus, very close to the genus Tetracme Bge., distinguished by its larger straw-colored (not white) flowers and short indehiscent fruit.

302 1. **T. bucharicum** Korsh. in Bull. Ac. Pétersb. V, sér. IX (1898) 421.

Annual, canescent with stellate hairs, branching from base, stem 7—22 cm high; leaves petioled, lanceolate or oblong, entire or dentate. Racemes elongating into fruit; pedicels short, 3—10 mm long, stout, appressed to stem; sepals ovate, the outer hairy, membranous along margin, ca. 1.75—2.5 mm long; petals short-clawed, blade oboval to suborbicular, obtuse, 2.5—3.5 mm long; siliques 3—4 mm long, 1.5—1.8 mm broad, pubescent, with stellate hairs, usually 1-seeded, rarely 2. March—April. (Plate XIX, Figure 3, and Plate XX, Figure 4).

Deserts, hills and slopes, compact sandy soil, and conglomerates, ca. 800—900 m. — Centr. Asia: Syr D. Endemic. Described from Bukhara, Baisun near the village of Kokaity. Type in Leningrad.

Genus 618. **LEPTALEUM** † DC. ††

DC., Syst.II (1821) 510.

Sepals linear, erect, not saccate. Petals linear, small, whitish or light pink. Longer stamens long-connate in pairs, often two of them abortive, then only 4 stamens. An oval nectariferous gland on both sides of shorter stamens, adjacent on the inner side. Ovary sessile, style short; stigma with 2 connate lobes. Fruit a long silique, tardily dehiscing, compressed bilaterally, valves stout, with one prominent midrib and small netted lateral veins. Septum spongy, with many parallel dividing walls of epidermal cells. Seeds numerous, small, biseriate, oblong, flattened. Cotyledons flat, embryo notorrhizal. Hairs small, furcate. — Small, branching annuals, leaves or leaf-segments thin, narrow.

1. **L. filifolium** (Willd.) DC., l. c.; Prodr. I (1824) 200; Ldb., Fl. Ross. I (1842) 176; Shmal'g., Fl. I, 62; N. Busch in Fl. cauc. crit. III, 4 (1910) 649; Kryl., Fl. Zap. Sib. VI (1931) 1380; Voron. in Fl. Yugo-vost. V (1931) 449. — L. longisiliquosum Fr. et Sint. in Bull. Herb. Boiss. (1893) 692. — Sisymbrium filifolium Willd., Sp. pl. III (1800) 495. — Ic.: Voron., l. c.

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* From the Greek tetra—four, akme —point, eidos —species.

** Treatment by N.A.Bush.

† From the Greek leptaleos—slender.

†† Treatment by I.T.Vasil'chenko.

303

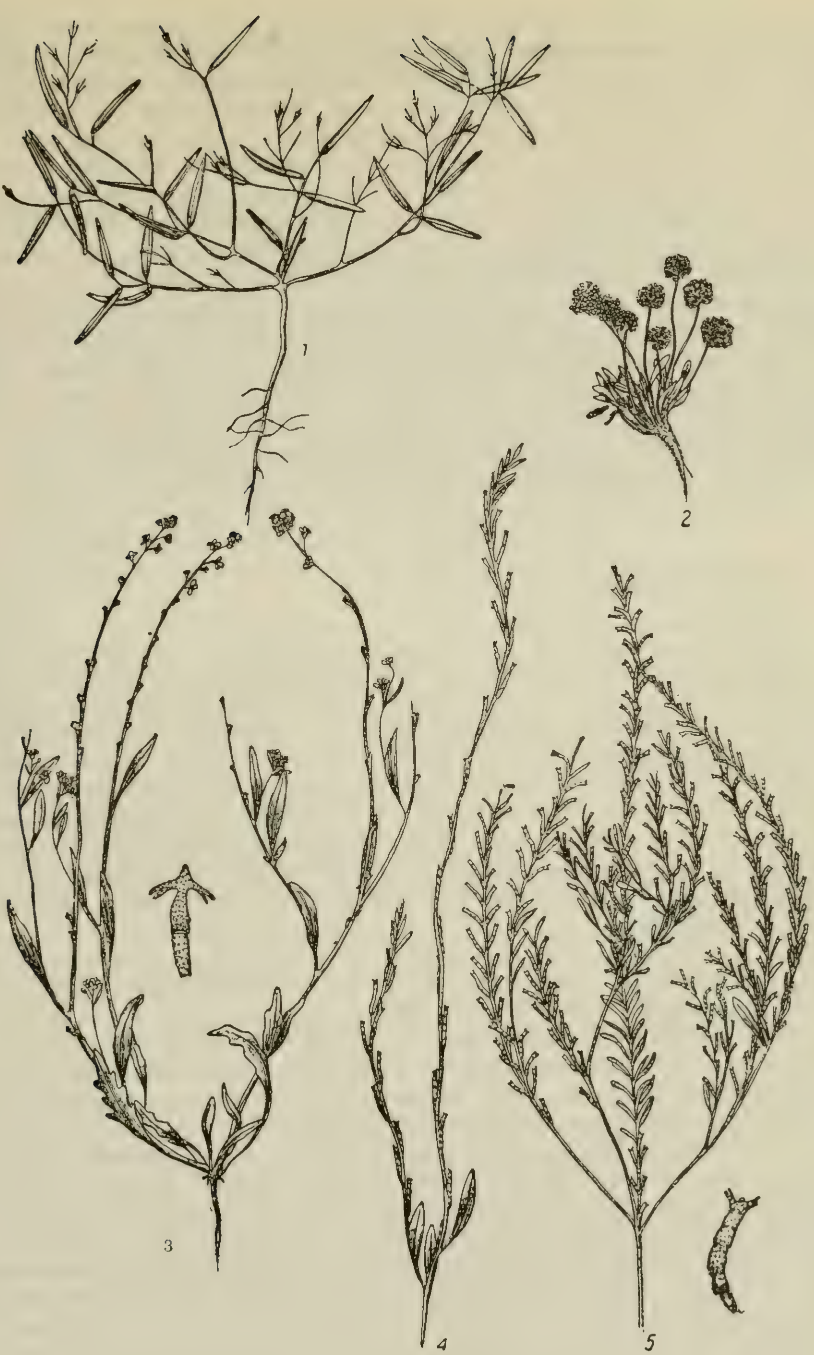

PLATE XIX. 1 — Leptaleum filifolium (Willd.) DC.; 2 — Braya rosea Bge.; 3 — Tetracmidion bucharicum Korsh. and its fruit; 4 — Tetracme pamirica Vass.; 5 — T. quadricornis (Steph.) Bge. and its fruit.

305 Annual, low (5—15 cm high), divaricately branching from base, with slender stem and branches, pubescent with small furcate, scattered, simple hairs or subglabrous; leaves sessile, narrowly linear to filiform, pinnately directed usually into 3 or 5 filiform small lobes or entire. Sepals linear, (3) 4—5 mm long; petals narrow, ca. 0.75—1 mm broad, twice as long as sepals; flowers solitary or in pairs, short-pedicelled, siliques broadly linear, short, 15—25 (30) mm long, 2—3 mm broad, flattened from the side of valves, with a prominent midrib and small prominent intricately netted lateral nerves, rather indehiscent, tapering gradually toward apex then abruptly ending with a very short stigma, usually grayish-bluish, bright at apex, glabrous or sparingly hairy; fruiting pedicels 2—3 mm long, thickened; seeds small (ca. 0.75 mm long), ellipsoidal. March—April. (Table XIX, Figure 1).

Clayey and sandy steppes. — European part: L. V.; Caucasus: Cisc. (?), Dag. (?), E. and S. Transc.; Centr. Asia: all regions. Gen. distr.: E. Med., Iran. Described from the Kuma River. Type in Berlin.

Note. I consider L. longisiliquosum Fr. et Sint., l. c., as L. filifolium (Willd.) D. C. var. longisiliquosum (Fr. et Sint.) Vass.

Genus 619. **STREPTOLOMA*** BGE.**

Bge. in A. Lehmann reliq. bot. in Arb. d. naturf. Ver. zu Riga I (1848) 155.

Sepals divergent, not saccate. Petals small, white. Filaments free, long, dilated at apex, outwardly wing-shaped. A small short-pyramidal nectariferous gland on both sides of shorter stamens. Ovary sessile, without style, stigma sessile, 2-lobed. Fruit a slender-cylindrical silique, more or less torulose, bivalvular, more or less twisted, valves convex, obscurely 1-nerved. Septum tender, without fibrous strand, with numerous parallel dividing walls of epidermal cells. Seeds uniseriate, pendulous, cotyledons flat, embryo notorrhizal. Hairs minute, sessile, bifid or simple hairs. — Small slender annual, strongly branching from base, with thin filiform branches.

1. **S. desertorum** Bge., l. c.; Boiss., Fl. Or. I (1867) 238. — Exs.: Al. Lehm., Rel. bot. No. 113; HFR No. 1852.

Annual, 5—25 cm high, strongly branching from base, with numerous, thin, filiform branches, appressed-pubescent, with sessile, bifid, and furcate 306 stalked hairs; leaves narrowly oblong, the lower petioled, more or less sinuate-dentate to pinnatipartite, with triangular lobes, upper leaves narrower, entire, sometimes all leaves entire. Sepals usually violet, ovate, ca. 1—1.5 mm long, pubescent; petals obovate, white, 2—3 (4) mm long, 1—1.5 (2) mm broad; siliques dehiscent when ripe, glabrous or more or less pubescent with bifid and simple, glandular hairs (var. lasiocarpum Vass.), rugose below and more or less spirally twisted, straight or contorted into a small ring, (5) 15—20 mm long, ca. 0.75 mm broad, stigma obtuse, sessile; pedicels thin, 2.5—5 (7) mm long; seeds oblong-linear, ca. 1 mm long. March—April.

Sands, sometimes clayey plains. — Centr. Asia: Balkh., Kyz. K., Mtn. Turkm., Amu D. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

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* From the Greek streptos — curved, coil and loma — joint, siliqua.

** Treatment by I. T. Vasil'chenko.

Note. The variety with densely pubescent fruit (namely var. lasiocarpum Vass.) is apparently correlated to the clayey soils of the mountainous part of Turkmenistan.

Genus 620. **DONTOSTEMON*** ANDRZ.**

Andrz. in DC., Prodr. I (1824) 190; Hayek, Crucif. Syst. (1911) 232; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 620.

Sepals erect, not saccate. Petals lilac or white. Filaments of longer stamens connate in pairs up to two-thirds of their height. A small pyramidal nectariferous gland at both sides of shorter stamens. Style very short, stigma capitate, slightly 2-lobed. Fruit a linear silique, cylindrical, bivalvular, wavy-torulose; valves convex, with a weak midrib; Septum stout, with stout fibrous strand and numerous dividing parallel walls of epidermal cells. Seeds uniseriate, rounded, narrowly marginate at apex. Cotyledons flat, embryo notorrhizal. Hairs branched, mixed with glandular ones. — Annuals and perennials, with entire or pinnatifid leaves.

Eight of the ten species of this Siberian-Mongolian genus are native to the Soviet Union.

1. Flowers white, leaves pectinate-dentate . . . 6. **D. pectinatus** (DC.) Turcz.
+ Flowers white, light pink, intensively pink or lilac. Leaves entire or irregularly few-denticulate . . . . 2.
2. Flowers small, petals ca. 3 mm long, light pink or white . . . . 5. **D. micranthus** C. A. M.
307 + Flowers much larger, petals ca. 7 mm . . . . 3.
3. Leaves entire, linear . . . . 4.
+ Leaves oblong-lanceolate, dentate . . . . 5.
4. Perennial, with rather stout root, pubescent with white, delicate hairs . . . . 3. **D. perennis** C. A. M.
+ Biennial, often with glandular hairs . . . . 4. **D. integrifolius** C. A. M.
5. Stem and leaves covered with spreading, white hairs. Siliques covered with farinaceous down . . . . 1. **D. hispidus** Maxim.
+ Hairs shorter, siliques glabrous . . . . 2. **D. dentatus** (Bge.) Ldb.

1. **D. hispidus** Maxim. in Bull. Acad. St. Pétersb. 18 (1873) 282; Kom., Fl. Manchzh. II (1903) 382, 384, 387, 388; N. Busch, Fl. Sib. et Or. Extr. VI, (1931) 621. — Clausia ussuriensis N. Busch, Not. Syst. H. P. IV (1923) 184. — Ic.: N. Busch, Fl. Sib. et Or. Extr. VI (1931) 622 et tab. geogr. 623.

Annual; stems 11—40 cm high, slender, erect, simple or branching, densely leafy; leaves petioled, elliptic-lanceolate, dentate-serrate, rather sparsely covered with long, white, spreading, rigid hairs and short glandular ones. Sepals pilose, 5—7 mm long; petals 11—17 mm long, ca. 6.5 mm broad, strongly pink, dark-veined, claw white, blade broadly oboval; fruiting pedicels glandular, 8—17 mm long; siliques 3—8 cm long, 1.5—2 mm broad, flattened, glandular-downy; style 2—3.5 mm long; seeds reddish brown, marginate, 2—2.5 mm long, 1.25—1.3 mm broad. June—July.

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* From the Greek odus, genitive odontos — tooth and stemon — stamen.

** Treatment by N.A.Bush.

Rocks, stony slopes, and coastal sands. — Far East: Ze.-Bu., Uss. **Gen. distr.:** Japan. Described from Olga Bay, on a mountain at 360 m. Type in Leningrad.

Note. One of the most ancient species of the genus, a Tertiary relict.

2. **D. dentatus** Ldb., Fl. Ross. I (1842) 175; Kom., Fl. Manchzh. II, 382—385, 387, 388; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 624. — Ic.: N. Busch, l. c., 625 et tab. geogr. 626. — Exs.: HFR No. 1307.

Annual or biennial, not glandular, sparsely covered with downy and longer hairs; leaves oblong-linear, remotely dentate, ciliate. Sepals 3—7 mm long; petals lilac, 6.5—11 mm long, blade oboval; pedicels and siliques glabrous; fruiting pedicels 3.5—7 mm long; siliques 2—6 cm long; style 0.5—1 mm long; seeds marginate, brown, 0.5—0.6 mm in diameter. May—June.

Rocks, bluffs, hills, and outcrops. — E. Siberia: Dau.; Far East: Ze.-Bu., Uss. **Gen. distr.:** Manchuria, Korea, Japan. Described from the hills of
308 Dauria, along the Argun River. Type in Leningrad.

Note. Evidently this species has been derived from the same ancestor of D. hispidus.

3. **D. perennis** C. A. M. in Ldb., Fl. Alt. III (1831) 121; Ldb., Fl. Ross. I (1842) 176; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 627; Kryl., Fl. Zap. Sib. VI (1931) 1388. — Ic.: Ldb., Ic. Fl. Ross., tab. 203; N. Busch, l. c., 628 et tab. geogr. 626.

Perennial, sparsely pubescent with white, delicate hairs; rootstock rather stout; stems slightly divaricate, some almost procumbent, branching, 5—15 cm long; leaves linear, somewhat narrowed toward base, acutish, entire at apex. Racemes 4—20-flowered, rather elongate post anthesis, up to 6 cm; sepals pilose, 3—4 mm long; petals 6.5—7.5 mm long, oblong-oval, gradually tapering into a claw, obtuse or somewhat emarginate at apex, pale lilac or white; filaments of longer stamens connate almost to apex, free only below anthers; fruiting pedicels 3.5—8 mm long; siliques 1.5—2.25—3.5 cm long, somewhat flattened, covered with short hairs or glabrous, slightly recurved or irregularly spreading; style very short, stout; stigma slightly broader than style, somewhat emarginate. May—July.

Stony, pebbly and solonetzic places. — W. Siberia: Alt.; E. Siberia: Dau. **Gen. distr.:** Mong. Described from stony places of Chuya steppe. Type in Leningrad.

4. **D. integrifolius** (L.) C. A. M. in Ldb., Fl. Ross. I (1842) 174; Kom., Fl. Manchzh. II (1903) 383, 384, 387; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 629. — Sisymbrium entegrifolium L., Sp. pl. (1753) 622. — Ic.: N. Busch, l. c., 630 et tab. geogr. 632.

Annual and biennial, glandulose (var. glandulosus Turcz.) or without glandular hairs (var. eglandulosus Turcz.); leaves linear, entire. Sepals lilac, with white rim, 2.5—3.5 mm long; petals 6—7.5 mm long, cuneate-oblong, pale lilac; pedicels pilose, in fruit 4—10 mm long; siliques 9—33 mm long, 1 mm broad, torulose, straight or slightly curved; style 1 mm long; stigma as broad as style or broader; seeds immarginate. June—July.

Stony, sandy, and solonetzic places. E. Siberia: Ang.-Say., Dau.; Far East: Ze.-Bu. **Gen. distr.:** Mong. Described from Siberia. Type in London.

5. **D. micranthus** C. A. M. in Ldb., Fl. Alt. III (1831) 120; Ldb., Fl. Ross. I, 174; Turcz., Fl. baic.-dahur. I, 150; Kom., Fl. Manchzh. II (1903) 384; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 633; Kryl., Fl. Zap. Sib. VI (1931) 1388. — Ic.: Ldb., Ic. Fl. Ross. tab. 353; N. Busch, l. c., 634 et tab. geogr. 623. — Exs.: HFR No. 1055.

309 Biennial, covered with simple, short, rigid, spreading hairs; stem 15—75 cm high, erect, simple or branching at summit, branches slightly declinate; radical leaves of the first year rosulate, narrowly oblong, tapering into a petiole, dentate, cauline leaves sublinear, entire, tapering at base, obtuse at apex. Racemes strongly elongated after flowering (to 25 cm); sepals 3 mm long; petals small, 4—4.5 mm long, light purple or white, linear-oblong, tapering into a claw, obtuse at apex; filaments of longer stamens connate nearly to apex, free only below anthers; fruiting pedicels 8—15 mm long, spreading; siliques 2—4 cm long, straight, suberect; style very short, 0.5—0.6 mm long; stigma slightly broader than style, entire; seeds 0.75 mm in diameter. June—July.

Stony and sandy places and steppes. — W. Siberia: Ob, Alt.; E. Siberia: Yenis., Ang.-Say., Dau. **Gen. distr.:** Mong. (north), N. China. Described from Altai (Charysh, Kan, and Chuya rivers). Type in Leningrad.

6. **D. pectinatus** (DC.) Ldb., Fl. Ross. I (1842) 175; Turcz., Fl. baic.-dah. I (1842) 153; Kom., Fl. Manchzh. II (1903) 382, 384, 387; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 635. — Sisymbrium pectinatum DC., Syst. II (1821) 485. — Ic.: N. Busch, l. c., 637 et tab. geogr. 638.

Biennial, covered densely with glands and sparsely with long white cilia; stem 12—75 cm high, sometimes low and with procumbent branches (var. humilior Trautv.), sometimes higher, simple or branching, erect, with declinate branches (var. elatior N. Busch); leaves pectinate-dentate. Sepals with white membranous rim, 3—4 mm long; petals 7—9 mm long, cuneate, oboval, white or slightly lilac; pedicels spreading, in fruit 7—20 mm long; siliques 17—36 mm long, 1.5 mm broad, ascending, glandulose, straight or slightly curved; style thinner than stigma, 1.75—2.5 mm long; seeds 1—1.25 mm long, ca. 0.7 mm broad, brown. June—July.

Stony, sandy, and pebbly places. — E. Siberia: Lena-Kol., Ang.-Say., Dau.; Far East: Ze.-Bu., Uda. **Gen. distr.:** Mong. Described from the Baikal area and Dauria. Type in Geneva.

Note. A taxon rather distinct from other species of the genus.

Genus 621. **DIPTYCHOCARPUS*** TRAUTV.**

Trautv. in Bull. Soc. Nat. Mosc. XXIII, I (1860) 108.

Sepals erect, not saccate. Petals clawed, linear, purple. Ovary sessile, style short, stigma with 2 lobes overlapping each other. A nectariferous
310 gland. On both sides of each shorter stamen. Siliques dimorphous: the upper flattened, dehiscent, containing broad-winged seed, the lower thickened, indehiscent, with narrowly marginate seeds. Seeds somewhat flattened. Cotyledons flat, embryo pleurorhizal. Hairs branching. — Annuals, with narrow, oblong or linear leaves.

Monotypic genus.

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* From the Greek dis —twice, ptychos—fold, stratum, series, and karpos —fruit.

** Treatment by I. T. Vasil'chenko.

1. **D. strictus** (Fisch.) Trautv. in Bull. Soc. Nat. Mosc. XXIII, I (1860) 108; Boiss., Fl. Or. I (1867) 144; N. Busch, Fl. cauc. crit. III, 4 (1910) 678; Shmal'g., Fl. I (1895) 61. — Raphanus strictus Fisch. ex M. B., Fl. taur.-cauc. III (1819) 452. — Chorispora stricta DC., Syst. (1821) 436. — C. stenopetala Rgl. et Schmalh., A. H. P. V (1877) 239. — Matthiola fischeri Ldb., Fl. Ross. I (1842) 110.

Annual, (10) 40—50 cm high, with erect and branching stem, sparsely pubescent with simple, thin, white, glandular hairs, rarely also with small furcate hairs; leaves oblong or oblong-linear (the upper narrowly linear to almost filiform), more or less remotely dentate, lower leaves even pinnatipartite. Racemes loose, 1- or 2-flowered; sepals linear-lanceolate, 4—5 mm long; petals linear, twice as long as sepals; siliques glabrous or (particularly the lower) pubescent, dimorphous: the upper dehiscent, linear, flattened, 50—80 mm long, 2.5—4 mm broad, with prominent midrib and less distinct lateral nerves, tapering abruptly into a fleshy style 3—5 mm long, with a capitate, slightly 2-lobed stigma; fruiting pedicels thickened, 3—6 (8) mm long; lower siliques indehiscent, broken up in joints, spongy, fleshy, irregularly cylindrical, broadened below, gradually tapering above, 25—60 mm long, 2.5—4 mm broad; seeds rounded-ellipsoidal, dark brown, 2.5—3 mm in size, lower siliques with a broad white wing, in the upper very narrowly rimmed. March—April.

Steppes and slopes on loamy solonetzic soils. — European part: L. V.; Caucasus: S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kara K., Mtn. Turkm., Amu D., Syr D. **Gen. distr.:** Dzungaria-Kashgar area, Iran. Described from the Balkhash area (near Ayagus and Chu rivers). Type in Geneva.

Genus 622. **CHORISPORA** * DC.**

DC., Syst. II (1821) 435.

Sepals erect, the lateral slightly saccate at base. Petals long-clawed, with dilated and more or less orbicular limb, yellow, lilac, or purplish. Filaments free, edenticulate. A pyramidal or crescent-shaped nectariferous
311 gland on both sides of shorter stamens. Ovary sessile, style indistinct, 2 lateral horn-shaped projections under stigma. Silique indehiscent, more or less cylindrical, wavy-torulose, constricted between seeds, breaking up into 1-seeded cells arranged in 2 rows. Septum stout, without fibrous strand. Seeds flattened, marginate. Cotyledons flat, embryo pleurorhizal. Hairs simple and glandular. — Annuals and perennials, with entire or pinnatilobed leaves.

1. Annuals, with slender root easily pulled out . . . . 6.
+ Perennials, often forming tufts . . . . 2.
2. Petals yellow . . . . 3.
+ Petals bluish pink . . . . 4.
3. Leaves acutely sinuate-dentate or pinnatipartite to pinnatisect, petals not longer than 5—8 (10) mm, 2—4 mm broad . . . . 2. **C. macropoda** Trautv.
+ Leaves pinnatisect. Petals 12—15 mm long, 5—7 mm broad . . . . 1. **C. songorica** Schrenk.

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* From the Greek khoris—separation and spora—spore.

** Treatment by I. T. Vasil'chenko.

4. Stems developed, 15–25 cm high . . . . 3. **C. greigii** Rgl.
+ Stems reduced, sometimes almost not developed at all . . . . 5.
5. Petals 18–20 mm long, 6–8 mm broad . . . 4. **C. bungeana** Fisch. et Mey.
+ Petals 5–8 mm long . . . . 5. **C. elegans** Camb.
6. Flowers light purple . . . . 6. **C. tenella** (Pall.) DC.
+ Flowers yellow . . . . 7.
7. Siliques 20–30 (40) mm long, 2.5–3.5 (5) mm broad, with 10–25 mm long style, on thickened pedicels 3–5 mm long . . . . . 7. **C. iberica** (M. B.) DC.
+ Siliques 15–20 mm long, 1.5–2 mm broad, with 5–9 mm long style, on pedicels 8–10 mm long . . . . 8. **C. sibirica** (L.) DC.

1. **C. songorica** Schrenk in Fisch. et Mey., Enum. pl. (1842) 57. — C. sibirica var. songorica O. Fedtsch., Rast. Pam. (1904) 12.

Perennial, with stem branching from base, 8–10 (40) cm high, pubescent with fine glandular hairs, rarely with simple ones; leaves oblong, pinnatisect (mainly at stem base), with narrow-lanceolate or linear-lanceolate segments. Sepals 5–7 mm long, finely pilose; petals bright yellow, 12–15 mm long, dilated at upper part to 5–7 mm, emarginate at apex; siliques 312 15–18 mm long, 2–3 mm broad, nodose-moniliform, slightly flattened, finely glandulose; fruiting pedicels 5–10 mm long, at lower part of plant about 10–20 (25) mm long. June–July.

Stony slopes, high-mountain meadows. — Centr. Asia: T. Sh., Dzu.-Tarb. **Gen. distr.:** Dzu.-Kash. Described from Ala-Tau (Dzhabyk). Type in Leningrad.

2. **C. macropoda** Trautv. in Bull. Soc. Nat. Mosc. (1860) 109; B. Fedchenko, Rast. Turk. (1915) 470.

Perennial, 5–8 (10) cm high, with many slender stems branching out from crown, sometimes subacaulescent, forming compact tufts, finely pubescent with glandular and simple hairs; leaves many, oblong, small, mostly radical, congested at base of plant, more or less dentate to pinnatipartite or pinnatisect, with small lanceolate lobes. Sepals 2–3 (4) mm long, sparsely hairy; petals yellow, 5–7 (8) mm long, linear-spatulate, dilated at apex, up to 1.5–2 mm; racemes short, dense, capitate; siliques cylindrical, irregularly flattened, abruptly and irregularly torulose, 10–15 (20) mm long, 2–2.5 (3) mm broad, finely glandular-hairy; style 2.5–3.5 (5) mm; pedicels 8–10 mm long. May–July. (Plate XXI, Figures 2 and 3).

Rocks, taluses, and glacial moraines, to 4,000 m. — Centr. Asia: T. Sh., Pam.-Al., Dzu.-Tarb. **Gen. distr.:** Dzungaria-Kashgar area. Described from the Schrenk collection, from the Dzhabyk District (Dzungaria-Tarbagatai). Type in Leningrad.

3. **C. greigi** Rgl. in A. H. P. VI (1878) 296.

Perennial, 15–25 cm high, with erect stems, glabrous, rarely sparsely hairy; leaves oblong, the radical numerous, cauline leaves few, pinnatipartite, with obtuse lanceolate lobes. Racemes short; sepals oblong, glabrous or beset with rigid, simple and glandular hairs mainly in upper part, usually violet, 6–7 mm long; petals bluish pink to nearly purple, 15–18 mm long, dilate at apex up to 5–6 mm and slightly emarginate; siliques 25–35 mm long, 2–2.5 (3) mm broad, on 15–25 mm long pedicels (pedicels of lower siliques up to 50 mm long, with style 5–7 mm long). June–July.

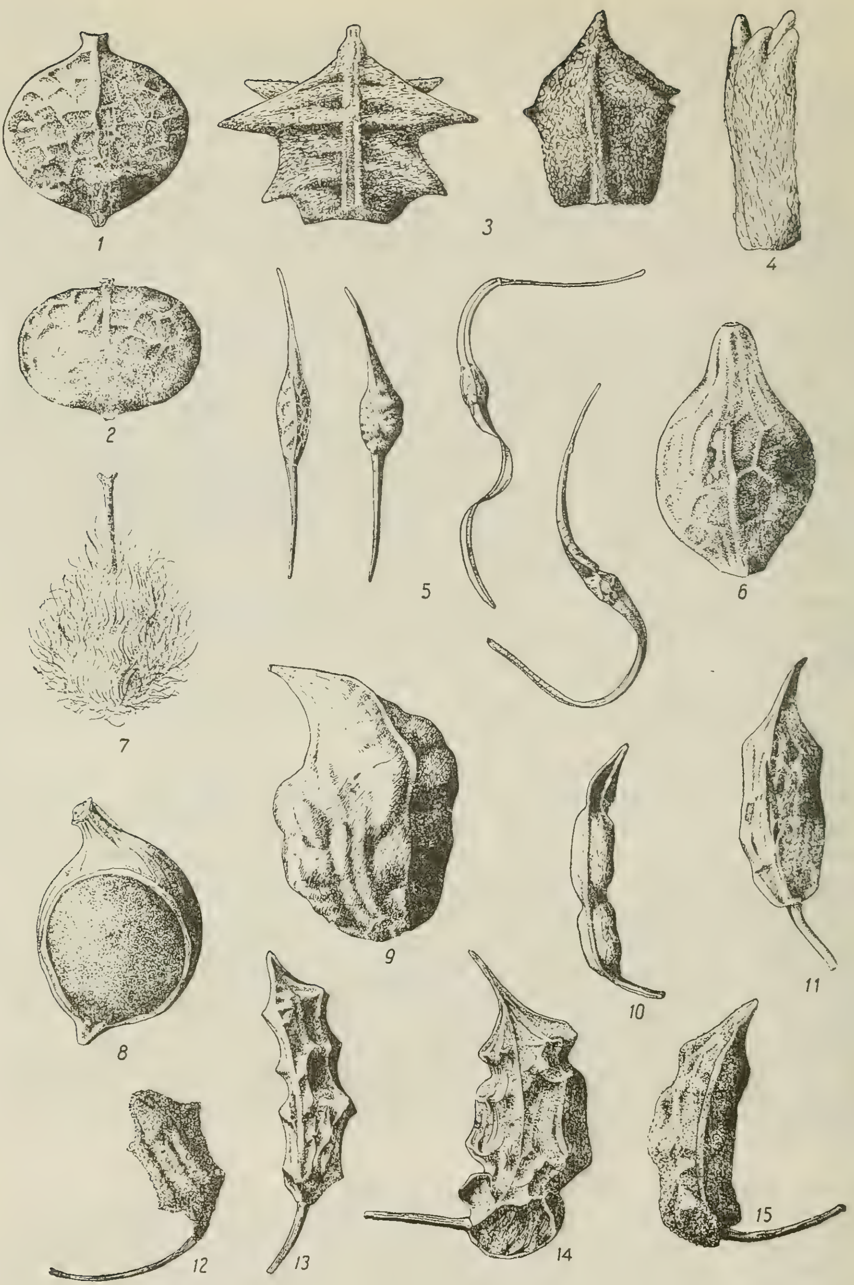

PLATE XX. Fruits: 1—Neslia apiculata C.A.M.; 2—N. paniculata Desv.; 3—Octoceras lehmannianum Bge., dimorphous fruits; 4—Tetracmidion bucharicum Korsh.; 5—Spirorhynchus sabulosus Kar.et Kir., various forms of fruits; 6—Calepina irregularis (Asso) Thell.; 7—Lachnoloma lehmanni Bge.; 8—Bunias cochlearioides Murr.; 9—B.orientalis L.; 10 and 13—Goldbachia laevigata (M.B.) DC., various forms of fruits; 11 and 14—G.reticulata (Ktze.) Vass., various forms of fruits; 12—G.verrucosa Kom.; 15—G.papulosa Vass.

315 Slopes, river valleys, in the forest zone up to 2,000—2,500 m. — Centr. Asia: T. Sh. Endemic. Described from Tien Shan (near the Sharin River). Type in Leningrad.

4. **C. bungeana** Fisch. et Mey. in Schrenk Enumer. pl. nov. I (1841) 96; Kryl., Fl. Zap. Sib. VI (1931) 1389. — C. exscapa Bge. ex Ldb., Fl. Ross. I (1842) 169; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 645. — Ic.: N. Busch, l. c., 644 et tab. geogr. 645.

Perennial, with reduced stems, 5—8 cm high, forming compact tufts, glabrous or subglabrous; leaves radical, many, oblong, long, often as long as or even overtopping flowering stems, more or less dentate or pinnatipartite, with a large terminal lobe and smaller lateral; petioles long and broad. Flowering stem (scapes) slender, glabrous, with large, solitary, bluish pink flowers at summit; sepals oblong, more or less pilose, usually violet 7—8 (10) mm long; petals (15) 18—20 (22) mm long, tapering into a long claw, dilated above up to 6—8 (11) mm, deeply emarginate at apex; siliques 20—30 mm long, ca. 2 mm broad, with style 5—7 mm long; pedicels thin, long, glabrous; seeds ellipsoidal, compressed, ca. 1.5 mm long, ca. 1 mm broad. May—July.

Stony slopes and taluses, and glacial moraines, to 4,000 m. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Dzu.-Kash. Described from the Baskan River (Dzungarian Ala-Tau). Type in Leningrad.

5. **C. elegans** Camb. in Jacq. Voyage dans l'Inde, IV. Descr. des Coll. bot. par M. Cambess. (1844) 15. — C. sabulosa Hook., Fl. br. Ind. I (1875) 167 p. p. — Ic.: Camb., l. c.

Perennial, forming tufts with many slender stems, 5—8 (10) cm high (sometimes hardly developed), beset with glandular and scattered, simple hairs; leaves narrowly oblong, long and fine, more or less sinuate-dentate to pinnatipartite or entire (var. hissarica Vass.), numerous, mainly basal. Racemes short, dense, subcapitate; sepals pilose, 3—4 mm long; petals bluish pink, 5—7 (8) mm long, dilated at apex to 2.5—3.5 (4) mm and emarginate; siliques cylindrical, somewhat flattened, finely glandulose, 10—15 (20) mm long, 2—5 mm broad, with 3—5 mm long style, on pedicels 5—10 mm long (lower to 20 mm). June—July.

Stony slopes, taluses, river valleys, and glacial moraines, to 4,000 m. — Centr. Asia: T. Sh., Pam.-Al. **Gen. distr.:** Ind.-Him. Described from India and the Himalayas (Kashmir). Type in Paris. 316

6. **C. tenella** (Pall.) DC., Syst. II (1821) 435 et Prodr. I (1824) 186; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 646 et tab. geogr.; Kryl., Fl. Zap. Sib. VI (1931) 1390; Ldb., Fl. Ross. I (1842) 169; Boiss., Fl. Or. I (1867) 143; Shmal'g., Fl. I (1895) 60; Voronov in Fl. Yugo-Vost. V (1931) 460. — Raphanus tenellus Pall., Reise III (1776) Anh. 105. — Exs.: HFR No. 704; Fl. Cauc. exs. No. 115. — Ic.: Voronov, l. c.

Annual, with erect stem 8—20 (40) cm high, with finely glandular and simple hairs; leaves oblong, the lower sinuate-dentate to pinnatilobate and pinnatipartite, cauline leaves more or less dentate to subentire. Racemes loose, short, elongating after flowering; sepals 5—6 mm long, usually bluish, glandular-hairy, oblong; petals light purple, 8—10 (12) mm long, ca. 1—2 mm broad; siliques spreading, cylindrical, gradually tapering toward tip, more or less curved, sparsely glandular-hairy, 15—30 mm long, ca. 1.8—2 mm (in lower part) broad, style subulate, ca. 10—15 (20) mm long; pedicels thickened, spreading, 3—5 mm long. April—May.

Steppes (clayey and solonetzic), sometimes as a weed in fields, roadsides, and near dwellings, etc. — European part: U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: all regions. **Gen. distr.:** Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Dzu.-Kash., Mong. Described from the Lower Volga. Type in Leningrad.

7. **C. iberica** (M. B.) DC., Syst. II (1821) 437 et Prodr. I (1824) 186; Ldb., Fl. Ross. I (1842) 169; Boiss., Fl. Or. I (1867) 144; Shmal'g., Fl. I (1895) 60; N. Busch, Fl. cauc. crit. III, 4 (1910) 695. — Raphanus ibericus M. B., Fl. taur. cauc. II (1808) 129. — Exs.: Fl. cauc. exs. No. 36.

Annual, with branching stem (5) 10—40 cm high, densely covered with small simple and glandular hairs; leaves lanceolate, pinnatipartite, with numerous lanceolate lobes perpendicular to petiole. Flowers in large racemes; sepals 5—7 (9) mm long; petals 10—15 (20) mm long, yellow; siliques 20—30 (40) mm long (without style), 2.5—3.5 (5) mm broad, flattened, cylindrical, densely and finely pubescent, rarely glabrous (f. glabrisiliqua N. Busch), with long (up to 10—25 mm) subulate beak ending with an inconspicuous stigma; pedicels thickened, densely and finely pubescent, 3—5 mm long. April—May.

Dry slopes, to 2,000 m, steppes, and sometimes as a weed in crops. — Caucasus: Dag., E. and S. Transc. **Gen. distr.:** Arm.-Kurd., Iran. Described from the Georgian SSR. Type in Leningrad.

317 Note. According to some references (see N. A. Busch, l. c.), the live plants of this species have a heavy, nauseating smell.

8. **C. sibirica** (L.) DC., Syst. veg. II (1821) 437; Ldb., Fl. Ross. I (1842) 169; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 640; Kryl., Fl. Zap. Sib. VI (1931) 1390. — Raphanus sibiricus L., Sp. pl. (1753) 369. — Ic.: N. Busch, l. c., 641 et tab. geogr. 642. — Exs.: Herb. Fl. Ross. No. 1306.

Annual, with stem slender, erect, branching from base, 8—25 cm high, covered with fine glandular and simple hairs; leaves oblong, more or less sinuate-dentate to pinnatisect with lanceolate lobes. Sepals pilose, 3—4 mm long; petals bright yellow, 8—10 (12) mm long, abruptly tapering below into a thin claw, dilated above to 4—5 (16) mm, emarginate at apex; siliques cylindrical, more or less arcuate, covered with fine glandular hairs, 15—20 mm long, 1.5—2 mm broad, with style 5—9 mm long; pedicels subhorizontally declinate, 8—10 mm long; seeds oval, rather compressed, ca. 1.5 mm long, ca. 1 mm broad. May—June.

Stony slopes and valleys, solonetzic clayey steppes, and sometimes as a weed. — W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: T. Sh. Gen. distr.: Mong., Dzu.-Kash. Described from Altai. Type in London.

Genus 623. **STERIGMOSTEMUM*** M. B.**

M.B., Fl.taur.-cauc.III (1819) 444; O.E.Schulz in Nat.Pfzf.17b (1936) 573.—Sterigma DC., Syst.II (1821) 579.

Sepals erect, not saccate. Petals (in species of the USSR) yellow, oblong-oboval, twice as long as sepals. Filaments of longer stamens dilated to middle or even higher, connate in pairs. An annular, tetragonous, nectariferous gland around base of shorter stamens, each with a large lateral appendage inside the longer stamens. Ovary sessile, style short, stigma shortly 2-lobed, with divergent lobes. Siliques linear, torulose (constricted between seeds), indehiscent, breaking up in transverse joints. Seeds biseriate, globose, cotyledons flat or slightly concave, embryo notorrhizal. Densely pubescent-tomentose with stellate (and sometimes even glandular) hairs. — Annuals, with leaves entire or pinnate.

318 1. Siliques densely stellate-hairy and with spreading, stiff bristles, 2–3 mm long . . . . 3. **S. acanthocarpum** Fisch. et Mey.
+ Siliques without bristles, only densely stellate-pubescent (sometimes glandular) . . . . 2.
2. Siliques covered only with stellate hairs . . . . . . 1. **S. tomentosum** M. B.
+ Siliques stellate-hairy, also with glandular hairs (in particular on pedicels) . . . . 2. **S. torulosum** (MB.) Stapf.

1. **S. tomentosum** M. B., Fl. taur. cauc. III (1819) 444; N. Busch, Fl. cauc. crit. III, 4 (1910) 684. — Sterigma tomentosum DC., Syst. II (1821) 579; Prodr. I (1824) 212; Ldb., Fl. Ross. I (1842) 215. — Cheiranthus tomentosus Willd., Sp. pl. III, 523.—Sterigma sulphureum var. angustifolium Boiss., Fl. Or. I (1867) 241.—Exs.: Al. Lehm., rel. bot. No. 153.

Annual; 20—40 cm high, with branching stem densely covered with finely stellate hairs, gray-tomentose; leaves oblong, pinnatilobate or pinnatipartite with lanceolate lobes, or more or less sinuate-dentate to subentire, petioled. Sepals oblong, densely pubescent, 3—4 (5) mm long; petals twice as long as sepals, tapering below, rounded and dilated above to 3—5 mm; siliques straight or more or less curved, cylindrical, tapering toward tip, torulose, densely covered with stellate hairs, with distinct slightly prominent, narrow, lateral stripes paired below, 20—60 mm long, 1.5—2 mm broad; fruiting pedicels 5—10 mm long; style 1.5—2.5 mm long; stigma 2-lobed, horizontally divergent; seeds oblong, olive-green, paler along radicle, 1.8—2 mm long (radicle which is somewhat longer than cotyledons). April—May. (Plate XVII, Figure 2).

Clayey-solonetzic, rocky and sandy places. — European part: L. Don, L. V.; Caucasus: Dag., E. and S. Transc., Tal.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh. Gen. distr.: Arm.-Kurd., Iran. Described from the Lower Volga area (Astrakhan Region). Type in Leningrad.

2. **S. torulosum** (M. B.) Stapf, Bot. Ergebn. II (1886) 301; N. Busch in Fl. cauc. crit. III, 4 (1910) 686. — Cheiranthus torulosus M. B., Fl. taur.-cauc. II (1808) 121. — Sterigmostemum incanum M. B., Fl. taur.-

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* From the Greek sterigma—support and stemon—stamen. The author of the treatment found it necessary to retain the name given by De Candolle (abbreviated) "Sterigma." The full name, "Sterigmostemum," has been introduced by the editors.

** Treatment by I.T.Vasil'chenko.

cauc. III (1819) 444. — Sterigma torulosum DC., Syst. II (1821) 580; Prodr. I (1824) 212; Ldb., Fl. Ross. I (1842) 215, 769; Boiss., Fl. Or. I (1867) 241, Suppl. 46.

Annual, gray-tomentose with dense stellate hairs mixed with glandular
319 hairs (stalked glands); stem branching, (10) 30—50 cm high; leaves oblong, pinnatilobate or more or less sinuate-dentate, sometimes subentire. Sepals 3—4 (5) mm long, oblong-lanceolate; petals 6—9 (to 12) mm long, tapering below, rounded and dilated above up to 3—5 mm; siliques densely covered with stellate and glandular hairs, straight or more or less curved, 30—50 mm long, 1.5—2 mm broad, torulose, with paired, distinct, slightly elevated lateral stripes; fruiting pedicels 5—12 mm long, covered with finely stellate and glandular hairs; style 1.5—2.5 mm long, stigma with 2 divergent lobes. April—May.

Stony and sandy places. — Caucasus: Cisc., Dag., E. and S. Transc. **Gen. distr.:** Arm.-Kurd. Described from the environs of Tbilisi. Type in Leningrad.

3. **S. acanthocarpum** Fisch. et Mey., Ind. sem. Hort Petrop. I (1835) 38; Ldb., Fl. Ross. I (1842) 216; N. Busch, Fl. cauc. crit. III, 4 (1910) 688. — Sterigma acanthocarpum Boiss., Fl. Or. I (1867) 242.

Annual, 10—30 cm high, branching, densely covered with fine, stellate hairs (sometimes sparsely glandular); leaves oblong, more or less undulately sinuate-dentate to entire, petioled. Sepals 3.5—4 mm long; petals 7—9 (10) mm; siliques 20—40 mm long, cylindrical, tapering above, with slightly elevated pale, narrow, paired lateral stripes, densely pubescent with stellate hairs and spreading, pale, coarse bristles 1.5—3.5 mm long; pedicels 5—10 mm long, covered with stellate hairs (sometimes also with glandular hairs); style 3—5 mm long, stigma divergently 2-lobed. April—May.

Solonetzic stony places. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd., Iran. Described from the environs of Nakhichevan. Type in Leningrad.

Genus 624. **ISKANDERA*** N. BUSCH**

N.Busch gen.nov.in Addenda VII, p.649.

Sepals erect, violet, the lateral slightly saccate. Petals violet, long-clawed. Filaments free, edenticulate. A polygonal nectariferous gland surrounding the base of each shorter stamen, with an appendage inside the longer stamens, appendages connate at their somewhat expanded ends. Ovary sessile, style very short, stigma shortly 2-lobed. Fruit a dehiscent, flattened silique, valves with one midrib. Septum without fiber layer, with
320 numerous parallel dividing walls of epidermal cells irregularly elongated. Seeds uniseriate, orbicular, with a broad membranous wing. Cotyledons flat. Embryo pleurorhizal. — Perennial, densely tomentose, with many stalked glands.

An ancient, relict, monotypic genus, endemic in Central Asia, combining characters of Parrya, Matthiola, and Anchonium.

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* After the Iskander-kul lake system, where this species grows.

** Treatment by N.A.Bush.

1. **I. hissarica** N. Busch sp. nova in Addenda VII, p. 486. — Anchonium elychrysifolium var. violaceum Kom. in Tr. SPb. O. E. XXVI (1896) 113.

Perennial; rhizome 1.5—2 cm thick, ligneous, strongly branching; each branch bearing a rosette; flower-stems and leaves (especially at margins) densely covered with white, tomentose-stellate hairs and long-stalked glands; flower-stems leafless, 7—12 cm high, in fruiting 9—20 cm; leaves sessile, oblanceolate, abruptly acuminate at apex, 2—3.5 cm long, to 5 mm broad in upper part. Racemes 5—10-flowered; sepals oblong, with membranous margin, 7—8 mm long, 1.5—2.5 mm broad, pubescent with strongly branched hairs and long-stalked glands; petals clawed, 10—12 mm long, with a narrowly obovate limb 7—10 mm long, 4—6 mm broad; fruiting pedicels 6—25 mm long; silique covered with stellate hairs, with large short-stalked glands on valves and along margin, 3—5 cm long, 5—7 mm broad; seeds dark brown, punctate, ca. 4.5 mm long, ca. 3 mm broad, together with wing ca. 6 mm long, ca. 4.5 mm broad. Fl. June—July; Fr. August.

Rocks, 2,200—2,800 m. — Centr. Asia: Pam.-Al. (Gissar Range). Endemic. Described from Kara-kul, Kulikalan, Lakhcha Pass (specimens of V. L. Komarov, A. Regel', Goncharov, and others). Type in Leningrad.

Genus 625. **ANCHONIUM*** DC.**

DC., Syst. II (1821) 578.

Sepals erect, the lateral saccate. Petals long-clawed, large, yellow in species of the USSR. Filaments edenticulate, long, connate in pairs. A nectariferous gland along sides of shorter stamens, with short lateral appendages inside the longer stamens. Fruit indehiscent, torulose (usually more or less constricted between seeds), with 2—6 1-seeded cells, persistent. Valves strongly convex, with a midrib. Septum curved, stout, with stout fibrous strand and numerous parallel dividing walls of epidermal cells. 321 Seeds uniseriate, oblong or ovate, cotyledons flat or slightly curved, embryo pleurorhizal. Plant densely tomentose-pubescent with branched and glandular hairs. Perennials, with entire leaves.

1. Plant 50—80 cm high, many-branched . . . . 3. **A. sterigmoides** Lipsky.
+ Plant much lower, stem not ramose (or slightly so) . . . . 2.
2. Fruit 15—30 mm . . . . 2. **A. elichrysifolium** DC. Boiss.
+ Fruit 6—12 mm long . . . . 1. **A. brachycarpum** (Trautv.) Vass.

1. **A. brachycarpum** (Trautv.) Vass. in Addenda VII, p. 472. — A. elichrysifolium Boiss. var. brachycarpum Trautv., Enum. pl. in A. H. P. II (1873) 503; N. Busch, Fl. cauc. crit. III, 4 (1910) 690.

Perennial, with numerous oblong radical long-petioled leaves and leafless (or nearly so) stem, 8—15 (20) cm high, tomentose-pubescent with simple and glandular hairs. Sepals 6—8 mm long; petals 10—12 (15) mm, orange-yellow; perianth and stamens persistent; fruit ovoid, obscurely tetragonous, nut-shaped, tomentose, 6—12 mm long, 2.5—3 mm broad, with small (ca. 1 mm) fleshy style ending in an obtuse, capitate, 2-lobed stigma; seeds 4—6, short-ovate, 2—2.5 mm in size, with radicle slightly longer than cotyledons, sometimes only 2 seeds, and the upper abortive; fruiting pedicels strict above, ca. 5–7 mm long. April. (Plate XXI, Figure 4).

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* From the Greek anchone — constriction.

** Treatment by I. T. Vasil'chenko.

Calcareous (?) mountain slopes. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd. Described from Turkey (from the Kagyzman area, Agri-Dagh Range). Type in Leningrad.

Note. The specimens I have seen had no mature fruit, and, in general, the description of those by botanists is incomplete; for this reason, more material is needed for an accurate determination of the systematic position of this species.

2. **A. elichrysifolium** (DC.) Boiss., Fl. Or. I (1867) 240; N. Busch, Fl. cauc. crit. III, 4 (1910) 690, pp. — Sterigma elichrysifolium DC., Syst. II (1821) 581 et Prodr. I (1824) 213. — Anchonium tournefortii Boiss., Ann. Sc. Nat. Sér. 2, XVII (1842) 386.

Perennial, 10–25(30) cm high, with rather stout, erect stem and few long, ascending branches, densely covered with tomentum of branching, fine and 322 glandular hairs; leaves long, oblong, the radical numerous, congested, long-petioled, cauline leaves fewer, sessile. Sepals 7–8 mm, oblong-lanceolate, pubescent, scarious along margin; petals orange-yellow, 10–12 (15) mm long, strongly tapering toward base, rounded and dilated above; siliques fusiform, cylindrical, torulose, constricted between seeds, densely pubescent, (12)–15–25 (30) mm long, ca. 2 mm broad; pedicels thin, usually recurved below, 5–10 mm long; style thin, 1–2 mm long, stigma obtuse, 2-lobed. April.

Mountain slopes, to 2,000–3,000 m. — Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd., Iran. Described from Armenia and Iran. Type in Geneva.

3. **A. sterigmoides** Lipsky in herb., descr. in Addenda VII, p. 473.

Perennial, 50–80 cm high, with coarse stout stem branching from base, densely covered with branched and rigid, spreading, glandular hairs; leaves oblong, the radical pinnatilobate, petioled, cauline leaves sessile, with thin longitudinal veins. Racemes loose, elongating after flowering; sepals 4–5 mm long; petals 8–12 mm long, yellow, tapering below, dilated and rounded above; siliques irregularly cylindrical, somewhat ovate, torulose, constricted between seeds, 1–3 (4)-pointed, 15–20 (25) mm long (with style), 2.5–3 mm broad, with paired lateral stripes below, distinct, prominent and flexuous, densely pubescent with finely branching and rigid, strict, glandular hairs, slightly prickly, tapering into a thin, 5–7 mm long style; stigma 2-lobed, with divergent and convolute lobes beneath; fruiting pedicels 5–10 mm long, ca. 1 mm thick; seeds ca. 3 mm long, oblong, brown. April.

Mountain slopes. — Centr. Asia: Mtn. Turkm. **Gen. distr.:** Iran (?). Described from the mountainous part of Turkmenistan. Type in Leningrad.

Note. Distinctly differs from other species of Anchonium in height, shape of radical leaves (pinnatilobate), rigid somewhat prickly, glandular hairs, as well as other characters. Eventually, it may have to be separated from the genus Anchonium.

Genus 626. **TRICHOCHITON*** KOM.**

Kom. in Trav. Soc. Natur. St.-Pétersb. XXVI (1896) 113.

Sepals divergent, not saccate. Petals linear-oblong, very small, ca. 1.5–2 mm long, whitish or lilac. Filaments free, edenticulate. A reniform nectariferous gland on both sides of shorter stamens. Ovary sessile, 323 without style, stigma sessile, tiny, slightly 2-lobed. Fruit an indehiscent silique, aseptate, linear-lanceolate, gradually tapering toward apex, valves flat, with midrib and small longitudinal lateral nerves. Seeds 2—4, oblong. Cotyledons flat, embryo pleurorhizal. Hairs branched and simple. — Annual, low, with entire leaves.

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* From the Greek tricho — hair and chiton — tunic.

** Treatment by I. T. Vasil'chenko.

1. **T. inconspicuum** Kom., l. c.; Fedch., Rast. Turk. (1915) 466; Cryptospora inconspicua O. E. Schulz., Pflanzenfam.

Annual; 5—30 (40) cm high, with branched, stalked, and simple hairs; leaves oblong, entire. Sepals lanceolate, ca. 1.5 mm long; petals linear-spatulate, longer than sepals; siliques lance-linear, 15—30 mm long, 1.8—2 mm broad, with branching and simple retrorse hairs, indehiscent, tapering gradually toward apex into a long beak ending with a small acute stigma; valves with thin midrib, rugose below; fruiting pedicels short, ca. 1—2 (3) mm long, thickened; seeds 3 mm long, 1.2 mm broad, greenish-yellowish, radicle nearly as long as cotyledon. May—June.

Mountain slopes to 3,000 m. — Centr. Asia: Pam.-Al., Syr D., Mtn. Turkm. Endemic. Described from Pamir-Alai. Type in Leningrad. (Plate XXI, Figure 1).

Genus 627. **EUCLIDIUM** * R. BR.**

R.Br.in Ait.Hort.Kew.ed.2, IV (1812) 74.

Sepals divergent, not saccate. Petals tapering toward base, white. Filaments free, edenticulate. A small, triangular, nectariferous gland on both sides of shorter stamens. Ovary sessile. Style elongated, conical. Fruit indehiscent, small, with recurved style, bilocular, ovoid, nut-shaped, with a ligneous wall and compact septum with numerous parallel dividing walls of epidermal cells. One pendulous seed in each fruit cell. Cotyledons flat, embryo pleurorhizal. — Low annuals, pubescent with bifid and simple stalked hairs, fruit persistent.

Monotypic genus, distributed from Hungary to the Himalayas.

1. **E. syriacum** (L.) R. Br., l. c.; Ldb., Fl. Ross. I (1842) 167; DC., Prodr. I (1824) 184; Boiss., Fl. Or. I (1867) 368; N. Busch, Fl. cauc. crit. III, 4 (1910) 646 et Fl. Sib. et Or. Extr. VI (1931) 599; Kryl., Fl. Zap. Sib. VI (1931) 1379. — 324 Anastatica syriaca L., Sp. pl. ed. II (1763) 895. — Bunias syriaca M. B., Fl. taur. cauc. II (1808) 88. — Ic.: Reichb., Icon. Fl. Germ. tab. I, fig. 4157; Jacq., Fl. Austr. I, tab. 6. — Exs.: Alex. Lehm., rel. bot., No. 88; H. F. A. M. No. 94.

Annual; stem spreadingly branching from base, (5) 10—20 (30) cm high, cineraceous green, covered (as well as leaves) with short and rigid stalked hairs and simple ones, sometimes irregularly dingy purple or bluish, especially in lower part; leaves oblong or oblong-lanceolate, obtuse at apex, with a small spine, tapering gradually toward base into a petiole, obscurely sinuate-dentate to subentire, lower leaves sometimes deeply sinuate to sublyrate-pinnatipartite, opposite, the upper alternate. Flowers in racemes, whitish or yellowish, 1—1.5 mm in size; petals linear-spatulate, longer than the oblong, divergent, pilose sepals; siliques appressed vertically to stem, on short stout pedicels, tetragonous-ovoid, ca. 3 mm long, 2—2.5 mm broad, densely covered with branching hairs, torulose-rugose, with a persistent, conical, subulate style 1.5—2 mm long, usually bent to side or recurved. Fl. April, Fr. May—June. (Plate XII, Figure 10).

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* From the Greek eu — good and kleio — close.

** Treatment by I. T. Vasil'chenko.

Steppes, roadsides, and as a weed. — European part: M. Dnp., Bl., Crim., V.-Don, L. Don, L. V., Transv.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., Kara K., Kyz. K., Syr D., T. Sh., Mtn. Turkm., Amu D., Pam.-Al.; Caucasus: Cisc., Dag., E. and S. Transc. **Gen. distr.:** Bal.-As. Min., E. Med., Arm.-Kurd., Iran., Dzu.-Kash., Ind.-Him. Described from western Europe (Hungary). Type in London.

Genus 628. **LITVINOVIA*** WORON.**

Voron.in Fl.Yugo-Vost.(1931) 452.

Sepals erect, slightly saccate at base; petals whitish or lilac. Style nearly 2 times longer than silique, sometimes short, ca. 0.5 mm long, thin-cylindrical, articulated at base, soon deciduous. Silique globular-ovate, indehiscent, 2-celled, 2-seeded, vesicular-verrucose, glabrous, soon deciduous. — Annual, hairs simple,

Monotypic desert-steppe genus.

327 1. **L. tenuissima** (Pall.) N. Busch comb. nova. — Euclidium tataricum DC., Syst. Veg. II (1821) 422 et Prodr. I (1824) 184; Boiss., Fl. Or. I (1867) 369; Ldb., Fl. Ross. I (1842) 167. — E. tenuissimum B. Fedtsch., A. H. P. XXIII, 2 (1904) 379. — Vella tenuissima Pall., Reise III (1776) Anhang, p. 780. — Bunias tatarica Willd., Sp. Pl. III (1800) 43. — Litwinowia tatarica Woron., l. c. (1931) 452. — Ic.: Pall., Reise III, tab. 4, f. 2 (1776). — Exs.: H. F. A. M. No. 95.

Annual; stem slender, erect with ascending filiform branches, 10—20(30) cm high, covered mainly in lower part with rather long, rigid, spreading hairs; leaves linear-lanceolate or oblong-linear, obtuse at apex, tapering gradually toward base into a petiole; radical and lower cauline leaves usually more or less sinuate-dentate to lyrate-pinnatipartite, with small lanceolate lateral lobes and larger oblong-lanceolate apical lobe, denticulate to entire; middle leaves linear-lanceolate, the upper linear, small. Flowers whitish or bluish, in racemes; sepals oblong, glabrous, the outer often with 1—3 bristles at apex; petals linear-spatulate, dilated at apex, 2.5—3.5(5) mm long, ca. 1.2 mm broad, 2 times longer than sepals; siliques 2.5—3 mm in size, with 6 small blunt ribs, 3-connate on each side, style long (nearly 2 times longer than fruit) or ca. 0.5 mm long (var. brevistigma Jarm.); seeds rounded, flattened; embryo pleurorhizal. March—April. (Plate XIII, Figure 16).

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* After D.I.Litvinov.

** Treatment by I.T.Vasil'chenko.

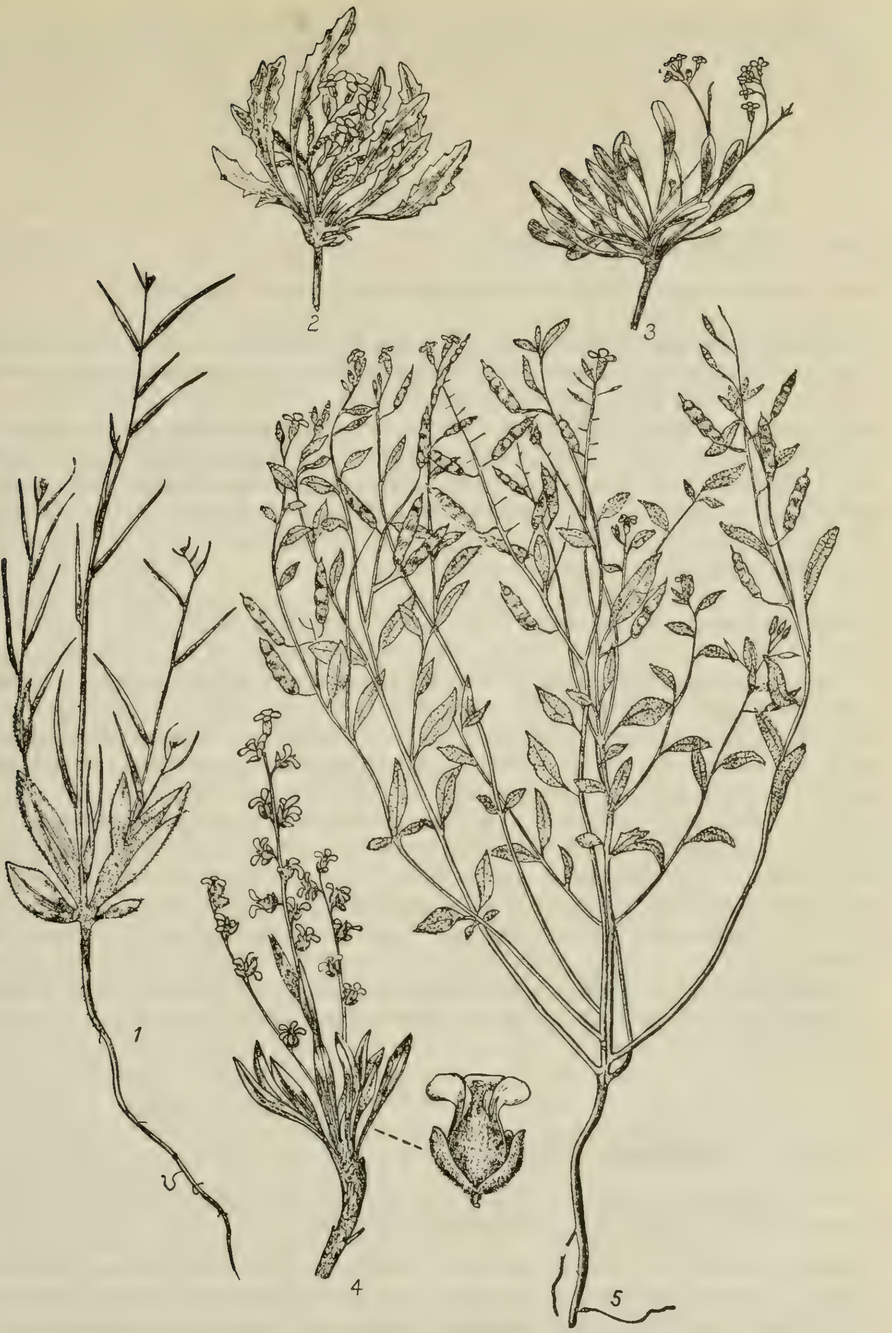

PLATE XXI. 1—Trichochiton inconspicuum Kom.; 2—Chorispora macropoda Trautv., with flowers and fruit and incised leaves; 3—C. macropoda Trautv., with flowers and entire leaves; 4—Anchonium brachycarpum (Trautv.) Vass.and flowers; 5—Cithareloma lehmanni Bge.

Steppes, mountain slopes, and as a weed. — European part: L. V.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., Kara K., Kyz. K., Mtn. Turkm., Amu D., Syr D., Pam.-Al., T. Sh. **Gen. distr.:** Dzu.-Kash., Iran. Described from the region of Inder Lake (Transcaspian steppes). Type in London.

Genus 629. **OCTOCERAS*** BGE.**

Bge.in Arb.naturf.Ver.zu Riga I (1848) 172: et in Mém.Acad.Sc.St.-Pétersb.VII (1854) 218.

Sepals divergent, not saccate. Petals very small, whitish. Filaments free, edenticulate. A small nectariferous gland on both sides of shorter stamens. Ovary sessile, stigma subsessile. Fruit indehiscent, nut-shaped, tetragonous, with a septum and a short beak at tip, rugose, bilocular, 2-seeded, with 4 pair of spines along ribs. Seeds pendulous, one in each cell. Cotyledons flat, embryo notorrhizal. Appressed-pubescent with branching hairs. — Small annuals with oblong, sinuate-dentate or lyrate leaves.

A monotypic Central Asian-Iranian genus.

328 1. **O. lehmannianum** Bge., l. c.; Boiss., Fl. Or. I (1867) 370; Fedch., Rast. Turk. (1915) 464. — Exs.: Lehm., rel. bot. No. 149.

Perennial; stem (5) 10—15 (20) cm high, spreadingly branched from base; leaves oblong, petioled, sinuate-dentate, the lower often lyrate-pinnatipartite, with ovate or lanceolate acute lobes and a larger apical lobe rounded at apex, with small spine. Flowers in racemes, very small (ca. 1 mm long); sepals covered with branching hairs (as is the whole plant); petals a little shorter than calyx; siliques 2—3 mm in size, on very short and stout pedicels, appressed to stem, falling together with parts of the stem-joints, with 4 pairs of compressed spines along ribs, the upper spine larger than the lower and often connate to it by a spiny wing, sometimes lower siliques without spines (var. tedshenicum Korsh.). March—April. (Plate XX, Figure 3).

Sandy deserts. — Centr. Asia: Ar.-Casp., Kara K., Kyz. K., Mtn. Turkm., Amu D., Syr D. **Gen. distr.:** Iran. Described from Kyzyl-Kum. Type in Leningrad.

Genus 630. **CHRISTOLEA**† CAMB. ††

Camb. in Jacquemont, Voy.Bot.(1844) 17 tab.17; Hayek, Crucif.-Syst.(1911) 239. — Ermania Cham.in Linnaea VI (1831) 533; Schulz in Engl.-Pr.Pflanzf.B.17b (1936) 547.

Sepals erect, the lateral saccate. Petals long-clawed, yellow, white or lilac. Filaments edenticulate, free. An annular nectariferous gland around base of shorter stamens, emarginate inside, with long appendages toward longer stamens, sometimes connate outside. Ovary sessile, style very short, stigma subcapitate. Fruit an oblong silique, usually tapering toward tip, compressed, valves flat, with weak midrib and veins, septum with thin-walled, polygonal epidermal cells, sometimes parallel to each other. Seeds obscurely biseriate, flattened, oblong, wingless or (very rarely) with narrow rim; cotyledons flat, embryo pleurorhizal. Hairs simple. — High-mountain and Arctic perennials, with stout, broadly cuneate leaves, dentate or crenate.

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* From the Greek okto — eight and keras — horn.

** Treatment by I.T.Vasil'chenko.

† After the French geologist, Jules Christol.

†† Treatment by N.A.Bush.

Five species of this genus grow in the Soviet Union. The genus evolved in the high mountains of Central Asia and western Tibet; from there it was distributed in the form of C. ermani, related to the Central Asian C. linearis, over the Stanovoi Range and to northeastern Asia, to the Arctic, 329 and even to Alaska. Until now this genus has comprised 2 species — C. crassifolia and C. pamirica. Parrya ermani, P. flabellata, and P. maidantalica should undoubtedly be referred to this genus. In addition, a new species, namely C. linearis, should be described.

1. Completely glabrous plants . . . . 2.
+ Rather long-hairy plants . . . . 3.
2. Rootstock branches whitish, shiny. Siliques narrow (ca. 0.3 cm broad) . . . . 3. **C. maidantalica** (M. Pop. et Baran.) N. Busch.
+ Rootstock branches neither shiny nor white. Siliques broader (ca. 4.5–6 mm broad) . . . . 2. **C. pamirica** Korsh.
3. Plant rosetted, flower-stems leafless, siliques broadly linear . . . . 5. **C. linearis** N. Busch.
+ Stems leafy, siliques oblong-lanceolate . . . . 4.
4. Flowers white or slightly yellowish (Arctic northeastern Siberia) . . . . 6. **C. parryoides** (Cham.) N. Busch.
+ Flowers not as above in color (Central Asia). 5.
5. Petals ca. 14 mm long, lilac, purple at base . . . . 4. **C. flabellata** (Rgl.) N. Busch.
+ Petals 6–6.5 mm long, yellow, with purple base . . . . 1. **C. crassifolia** Camb.

1. **C. crassifolia** Camb. in Jacquem., Voy. Bot. IV (1844) 17, tab. 17; Hook., Fl. of Brit. India I, 154; Korsh., Fragm. Fl. Turk. (1898) 415 No. 28.

Perennial; whole plant (siliques inclusive) densely gray-white pubescent; rootstock stout, bearing at summit many relics of old stems together with live, very leafy branching stems, procumbent or ascending, 8–25 cm high; leaves cuneate-obovate, broad, sessile or subsessile, more or less acutely denticulate. Sepals oblong, with membranous hyaline rim, 3.5–4 mm long; petals oblong-oboval, yellow, purple at base, 6–6.5 mm long; fruiting pedicels 5–7 mm long, ascending; siliques pilose, oblong-lanceolate, flattened, 10–25 mm long, 4–7 mm broad, stigma subsessile, slightly 2-lobed; seeds black-brown, 2 mm long, 1 mm broad. June–July. (Plate XV, Figure 3).

Centr. Asia: Pam.-Al. (Pamir, Shugnan). **Gen. distr.:** W. Tibet. Described from western Tibet, 3,400–4,100 m. Type in Paris.

2. **C. pamirica** Korsh. in Mem. Ac. Petersb. VIII Ser., Vol. IV, No. 4 (1896) 330 89. — C. crassifolia var. pamirica Korsh., Fragm. Fl. Turk. (1898) 415.

Perennial; rootstock very stout, branching, developing many stems; stems branching from base, stout, brittle when dry, 8–30 cm high; crown covered with with relics of dead stems; leaves rather fleshy, completely glabrous, cuneate or cuneately obovate, irregularly few- (mostly 3-) toothed or slightly sinuate, at apex, otherwise entire. Racemes few-flowered; sepals oblong, slender, slightly membranous at apex, ca. 3.5 mm long; petals ca. 6–7 mm long, clawed, blade oboval, rounded at apex; fruiting pedicels 5–10 mm long; siliques completely glabrous, 15–26 mm long, ca. 4.5–6 mm broad, ovate: lanceolate, flattened; style nearly absent, stigma capitate, 2-lobed only in young flowers; seeds black-brown, punctate under strong magnifying glass, wingless, 2.25 mm long, 1 mm broad; embryo pleurorhizal. June–July.

Stony mountain slopes, 3,600–4,000 m. – Centr. Asia: Pam.-Al. (Pamir, Shugnan). Endemic. Described from Kara-Kul Lake and from localities along the Balian-Kiik River, south of the Kainda Pass. Type in Leningrad.

3. C. **maidantalica** (M. Pop. et Bar.) N. Busch comb. nova. – Parrya maidantalica M. Pop. et Baran. in Not. Syst. H. P. IV, 21–22 (1923) 175.

Perennial, completely glabrous, fleshy; rootstock branching; branches rather robust, to 10–15 cm long, whitish, shiny; stems leafy, 2–5 cm long, stoutish, simple; leaves robust, obovate to oblong, petioled, obtuse, large-toothed or sometimes sinuate-dentate, 1–1.25 cm long, 0.8–1.2 cm broad. Floriferous shoots lateral, short, not exceeding radical leaves, 5–7-flowered; pedicels glabrous or (rarely) with patulous hairs, horizontal or slightly recurved below, 1–2 cm long, somewhat thickened at apex; flowers large, whitish, slightly lilac; siliques flattened, linear, often arcuate or S-shaped, 2–4 cm long, 0.3 cm broad, glabrous, smooth; style ca. 1 mm long; valves with one midrib; septum stout, with a strand; stigma short, 2-lobed; seeds uniseriate, with narrow membranous rim, 2 mm long, 1.5 mm broad, flattened. Mature fruit August.

Centr. Asia: T. Sh. Endemic. Described from the mountains of Talass Ala-Tau, from the Maidantal Pass. Types in Leningrad and Tashkent.

4. C. **flabellata** (Rgl.) N. Busch, comb. nova. – Parrya flabellata Rgl. in E. Rgl. et Herd. in Bull. Soc. Nat. Mosc. (1870) II, p. 261.

Perennial; stem and leaves, pedicels and sepals densely gray-tomentose; rootstock with few (sometimes many) long and thin shoots covered with pale, squamose basal leaves and bearing a rosette of broad crenately lobed leaves and floriferous leafy shoots 5–15 cm high; shoots with broad crenate
331 or crenate-lobed leaves. Racemes short, even in fruit, dense; sepals oblong, with white membranous rim, 6–8.5 mm long, ca. 2–2.5 mm braod; petals violet, rounded, oboval, clawed, 10–15 mm long, 3.5–4.5 mm broad; fruiting pedicels 4–10 mm long; siliques flattened, pilose, 4–6 cm long, 2–5 mm broad, valves with one midrib sometimes rather indistinct, and with lateral nerves; stigma sessile; seeds brown, 1.8–2 mm long, 0.75–1 mm broad, rimless or wingless. June–July. (Plate XV, Figure 1).

Moraines, taluses, and rock streams of the alpine zone, 3,200–4,600 m. – Centr. Asia: T. Sh., Pam.-Al. **Gen. distr.**: Kuldja. Described from Tien Shan. Type in Leningrad.

5. C. **linearis** N. Busch, sp. nova in Addenda VII, p. 473.

Perennial; the whole plant (including siliques) soft-villous with long white hairs; rootstock simple or branching, covered with relics of old dead leaves; all leaves rosulate, broadly obovate, crenate toward apex, tapering into a short and broad petiole; scapes 5–10 cm high, many-flowered with flowers already at the very base. Flowers small; sepals ovate, 2.5–3 mm long; dark violet, membranous at margin; petals 5–5.5 mm long, dark violet, oboval, clawed; fruiting pedicels 2–5 mm long; raceme secund, all siliques turned to one side; siliques linear, 20–35 mm long, 2 mm broad, midrib quite distinct; style broad and very short, up to 0.5 mm long; stigma 2-lobed; seeds rufous, 1.5–1.7 mm long, 1–1.25 mm broad, wingless; embryo pleurorhizal. July. (Plate XV, Figure 4).

Centr. Asia: Pam.-Al. (Shugnan). Endemic. Described from the upper reaches of the Abkhara River, from southern Khchaerrez and from the slope of Shitkharv. Type in Leningrad.

6. **C. parryoides** (Cham.) N. Busch, comb nova. — Parrya ermani Ldb., Fl. Ross. I (1842) 132, 752; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 659; Kom., Fl. Kamch. II, 195. — Draba parryoides Cham. in Linnaea 6 (1831) 533. — Ermania parryoides Cham. in Erman, Verz. (1835) 62. — Ic.: Rgl., Pl. Radd. (1861) tab. IV, f. 5–7; Chamisso in Erman, Verz. tab. XVII, f. 1; N. Busch, l. c., 661 et tab. geogr. 662.

Perennial; pedicels and sepals densely gray-tomentose; stem bilaterally so; root with few (sometimes many) rather long and thin shoots, covered with pale, squamose basal leaves bearing above a rosette of broad crenate-lobate green leaves, and floriferous shoots. Floriferous shoots 5–27 cm high, with few leaves much smaller than the radical, reduced upward; the uppermost often cuneate-oblong, gradually tapering toward base, entire; sepals oblong, with white membranous rim, 2–3.5 mm long, 1.5–2 mm broad; 332 petals white or slightly yellowish, orbicular-oboval, tapering at base into a claw, 4.5–5 mm long, 2–3 mm broad; fruiting pedicels 5–17 mm long; siliques oblanceolate-oblong, flattened, 19–33 mm long, 1.5–3.5 mm broad in the broadest place (closer to tie); style nearly absent (0.2 mm long); seeds brown, oblong, rimless or wingless, 1.75–2 mm long, 1–1.3 mm broad. June–July. (Plate XV, Figure 2).

Stony places, friable taluses, and lavas. — Arctic: Chuk., An.; Far East: Kamch., Okh. Endemic. Described from Kamchatka, from lava of the Shiveluch volcano, 1,040 m. Type in Leningrad.

Genus 631. **FARSETIA** * TURRA**

Turra, Farsetia nov.gen.I (1765) 5; Prantl in Engl.-Pr., Nat.Pflzf.III, 2 (1891) 200; Schulz in 2-te Aufl.B.17 b (1936) 486; Hayek, Crucif.-Syst. (1911) 239.

Sepals erect, not saccate. Petals narrow, purple. Filaments simple (edenticulate), free. A crescent-shaped nectariferous gland, open inside, on outer side of shorter stamens. Ovary sessile, style distinct, stigma bipartite. Fruit bivalvular, flattened, linear or elliptic, valves flat, with a weak midrib. Septum with fibrous strand and numerous parallel dividing walls of epidermal cells. Seeds uniseriate or biseriate, flattened with coriaceous wing. Cotyledons flat, embryo pleurorhizal. Hairs bipartite, eglandulose. — Undershrubs with entire leaves.

An East Mediterranean genus, of its 12 species only one is in the Soviet Union. The genus is expanded to Arabia, India, and Afghanistan in the east, and to Algeria in the west. All species are xerophytes.

1. **F. spathulata** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) No. 1, 149; O. et B. Fedtsch., Consp. (1906) 43.

Perennial; entire plant, except for petals and stamens, densely covered with stellate hairs, cespitose; stem prostrate or ascending or erect, 6–25 cm high; radical leaves and leaves of fruitless shoots suborbicular, tapering into a short petiole and shortly acuminate at apex, cauline leaves cuneate or lanceolate-oblong, acuminate; sepals reddish, 5–6 mm long, oblong; petals pink, sometimes white, narrowly spatulate, 9–11 mm long; fruiting pedicels 5–6 mm long, ascending; siliques flattened, globular, 6–8 mm in diameter; style 1–2 mm; seeds 2 in each cell, brown, winged, together with wing ca. 2.5–3 mm in diameter. April–May.

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* After P. Farseti, Venetian naturalist.

** Treatment by N.A. Bush.

Rocks, stony places. – Centr. Asia: Dzu.-Tarb. Endemic. Described from Dzungaria, from Chingilda rivulet between the Ayaguz and Lepsa rivers. Type in Leningrad.

333 Note. Berteroa spathulata C. A. M. resembles this species in appearance but is distinguished by the shape of its radical, long-petioled leaves, the longer fruiting pedicels, the smaller, more glabrous fruit with style ca. 3 mm, in addition to the generic differences.

Genus 632. **CITHARELOMA*** BGE.**

Bge.in Del.sem.Horti Dorpat.VI (1843) 2; et in Linnaea XVIII (1844) 149.

Sepals erect, the lateral saccate. Petals long-clawed, white or purple. Filaments free, edenticulate. A crescent-shaped nectariferous gland on both sides of shorter stamens, connate inside in pairs. Ovary sessile, style elongated, stigma 2-lobed, with long, erect lobes. Fruit broadly linear or elliptic silique, often emarginate at both ends, bivalvular, compressed, valves flat, with a distinct midrib. Septum thin, with strand and numerous parallel transverse walls of epidermal cells. Seeds numerous, uniseriate or biseriate, flattened, globular, with broad clear rim along margin. Cotyledons flat, embryo pleurorhizal. – Annuals, pubescent with stellate hairs or subglabrous, with stem divaricately branching from base.

Endemic Central Asian genus. Two species.

1. Siliques broadly linear, 25–45 mm long, on short (2–3 mm) thickened pedicels. Flowers white . . . . 2. C. vernum Bge.
+ Siliques linear-elliptic, panduriform or shortly ovate, 5–15 mm long, on long (5–10 mm) thinner pedicels. Flowers purple . . . . 1. C. lehmanni Bge.

1. **C. lehmanni** Bge., l. c.; Al. Lehm., rel. bot. in Arb. naturf. Vereins zu Riga I (1848) 160; Boiss., Fl. Or. I (1867) 238. – Exs.: Al. Lehm., rel. bot. No. 123; HFR No. 1106.

Annual green plant; stem 8–40 cm high, profusely divaricately branching from base; pubescent with stellate hairs, sometimes subglabrous; leaves relatively small, oblong-ovate, more or less wavy-sinuate or entire, with broad petioles; sepals 4–6 mm long, narrow, linear, convergent; petals 8–10(12) mm long, linear-spatulate, whitish; siliques of different forms: 1) linear-elliptic, flattened, 14–16 mm long, ca. 5 mm broad, rounded at both ends, about 8-seeded, thrice constricted between seeds; 2) panduriform,

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* From the Greek kithara – ancient Greek musical instrument and loma – segment, silique, according to the original form of fruit encountered in this plant.

** Treatment by I.T. Vasil'chenko.

334 4-seeded, shorter, and 3) globular-ovate, short, 2-seeded; valves flat, thin, with one prominent transverse nerve, finely netted-veined; style 2–3 mm long, ending with an obscurely 2-lobed stigma; fruiting pedicels relatively thin, 5–10 mm long; seeds ca. 3–4 mm in size. April–May. (Plate XXI, Figure 5).

Sands. – Centr. Asia: Balkh., Kyz. K., Kara K. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

2. **C. vernum** Bge. in Linnaea XVIII (1844) 149; Al. Lehm., rel. bot. in Arb. d. naturf. Vereins zu Riga I (1848) 160; Boiss., Fl. Or. I (1867) 239. – Exs.: Al. Lehm., rel. bot. No. 124.

Annual, with relatively stout stem divaricately branching from base, densely (subtomentose) covered with short, sessile, stellate and branching stalked hairs; leaves oblong-ovate, large, more or less undulate, largely sinuate-dentate. Sepals linear, 5–7 mm long; petals linear-spatulate, 10–12 mm, bluish pink to nearly purple; siliques broadly linear, slightly curved or straight, 25–45 mm long, 4–6 mm broad, with thin midrib below, torulose, convex at seeds; style fleshy, 3–4 mm long, ending with a capitate, slightly 2-lobed stigma; pedicels covered mostly with branching, spreading hairs, thickened in fruit and very short (2–3 mm long); seeds ca. 3 mm in size. March–April.

Sands (clayey ?). – Centr. Asia: Balkh., Kyz. K., Kara K. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

Genus 633. **LACHNOLOMA** * BGE.**

Bge. in Delect. Sem. Horti Dorp. (1843) p. VIII; Pl. Lehman., 217

Sepals erect, convergent at apex, separating only in fruit, small, the lateral saccate. Petals whitish pink. Filaments free, edentate. Ovary sessile. Silicles nut-shaped, compressed-tetragonous, bilocular, 2-seeded (one in each cell), densely covered with long, silky hairs; style longer than silicle. Septum spongy. Stigma 2-lobed. Seeds pendulous, obovate. Embryo notorrhizal. – Small annual, with branching hairs.

Monotypic genus.

1. **L. lehmanni** Bge., l. c. et in Mém. Acad. Pétersb. VII (1854) Al. Lehm.,
rel. bot.; Boiss., Fl. Or. I (1867) 369. – Ic.: Bge., Ic. Pl. nov. tab. 8. – Exs.: Al.
335 Lehm., rel. bot. No. 148; H. F. A. M., No. 77.

Annual, (10)15–20(30) cm high, cineraceous green, densely pubescent with branching hairs; stem simple or branching; leaves alternate, lanceolate or oblong, tapering at base into narrowly winged rather long petioles and acute at apex, sparsely and strongly sinuate-dentate to pinnatilobate-dentate or pinnatipartite, sometimes (more often only the upper) entire. Inflorescence a few-flowered (12–15) raceme; sepals oblong-ovate, villous, 6–7 mm long, more or less violet; petals up to 10 mm long, linear, dilated and rounded at apex; silicle ovate, compressed-tetragonous, densely white-silky, when mature resembling cotton seeds in appearance, ca. 5 mm long. April–May. (Plate XX, Figure 7).

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* From the Greek lakhnos – wool and loma – segment, silicle.

** Treatment by I.T. Vasil'chenko.

Stone and stony-sandy (rarely sandy) deserts, riverbanks, and old stream channels. – Centr. Asia: Ar.-Casp., Balkh., Kara K., Kyz. K., Amu D., Syr D., T. Sh. Endemic. Described from Kyzyl-Kum. Type in Leningrad.

Genus 634. **LUNARIA** * L.**

L., Sp.pl. (1753) 653; Gen. (1754) 197.

Sepals erect, saccate at base. Petals long-clawed, large, violet. Filaments free, simple or denticulate. A large annular nectariferous gland at base of shorter stamens, outwardly 2-lobed inwardly 3-lobed, sometimes divided into an inner and outer part. Ovary on a gynophore, style long, stigma 2-lobed. Fruit a very large elliptic or suborbicular silicle, compressed, borne on a pedicel (gynophore) up to 15 mm long. Valves flat, netted-veined. Septum silky-shiny with a fibrous layer and numerous transverse parallel dividing walls of epidermal cells. Seeds few, biseriate, roundish, flattened, with a coriaceous wing. Cotyledons flat or curved crosswise over base; embryo pleurorhizal. – Perennials and annuals, with large entire leaves.

Of the three European species, one is found in the USSR.

1. **L. rediviva** L., Sp. pl. (1753) 653; Ldb., Fl. Ross. I (1842) 133; Shmal'g., Fl. I (1895) 84.

Perennial; stem 30–100 cm high, erect, branching above, scabrous; leaves cordate, dentate, shortly pilose, petioled; flowers large, fragrant; petals lilac, ca. 14 mm long; silicles pendulous, large, 4–5 cm long, elliptic, acute at both ends; seeds reniform, twice as broad as long. April–June.

Forests. – European part: Lad.-Ilm, U. Dnp., U. V., V.-Don, M. Dnp.
336 Gen. distr.: Scand., Atl. Eur., Centr. Eur., Med., Bal. Introduced into N. Am. Described from Europe. Type in London.

Note. This species is characteristic of broad-leaved forests. An ancient (Tertiary) forest type. Up to now not found east of Cheboksary.

Genus 635. **FIBIGIA** † MEDIC. ††

Medic., Pflanzengattungen I (1792) 90; Hayek, Crucif.-Syst. (1911) 242.

Sepals erect, the lateral saccate at base. Petals white, entire. Filaments free, edentate or short with one tooth. A triangular nectariferous gland on both sides of shorter stamens. Ovary sessile. Style distinct. Stigma shortly 2-lobed. Fruit a dehiscent silicle, elliptic or suborbicular, broad, compressed. Valves flat, mostly nerveless. Septum thin, without fibrous layer, with numerous parallel walls of epidermal cells. Seeds flattened, often with a coriaceous wing. Cotyledons flat, embryo pleurorhizal. Hairs branching. – Perennial herbs or undershrubs, with entire leaves.

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* From the Latin luna – moon.

** Treatment by N.A. Bush.

† After Johann Fibig, a professor in Mainz.

†† Treatment by N.A. Bush.

An East Mediterranean and Near Asian genus; 4 of its 12 species are represented in the USSR.

1. Petals bright violet. Silicles glabrous . . . . 4. **F. suffruticosa** (Vent.) Sweet.
+ Petals yellow. Silicles pubescent . . . . 2.
2. Silicles elliptic, not broader than 14 mm. Wing of seed not wider than 1.5–1.75 mm . . . . 3.
+ Silicles broadly elliptic or broadly ovate, 15–22 mm broad. Wing of seed 2–5.5 mm wide . . . . 2. **F. macroptera** Boiss.
3. Silicles densely covered with short stellate hairs . . . . 1. **F. clypeata** (L.) Medic.
+ Silicles densely villous with simple, long hairs . . . . 3. **F. eriocarpa** Boiss.

Section 1. **EUFIBIGIA** Boiss., Fl. Or. I (1867) 257; N. Busch in Fl. cauc. crit. III, 4 (1910) 624.

1. **F. clypeata** (L.) Medic., Pflanzengatt. I (1792) 90; N. Busch in Fl. cauc. crit. III, 4 (1910) 624. – Alyssum clypeatum L., Sp. pl. (1753) 651. – Farsetia clypeata Ldb., Fl. Ross. I (1842) 134; Shmal'g., Fl. I, 84. – Ic.: Rchb., Ic. Fl. Germ. tab. XXIII, f. 4287.

337 Perennial; stem 30–75 cm high, simple or branching, densely leafy; radical leaves oblong, eroded or entire, petioled, cauline leaves oblong-linear, upright, dentate. Sepals 6–7 mm; petals yellow, 10–13 mm; fruiting pedicels short; ca. 2.5 mm long; silicles 14–28 mm long, 9–12 mm broad, elliptic or oblong, straight or slightly contorted, densely covered with short stellate hairs; style 1.5–2 mm long; cells with ca. 6 seeds; wings narrower than seeds; seeds rufous, together with wing 5–6 mm in diameter, the wing alone 1.25–1.5 mm wide. March–May.

Rocks, dry hills, and slopes, in dry, rocky places up to 1,000 m. – European part: Crim.; Caucasus: W., E., and S. Transc. **Gen. distr.**: Med. (E.), Bal.-As. Min., Arm.-Kurd., Iran. Introduced into central France. Described from Europe. Type in London.

2. **F. macroptera** Boiss., Fl. Or. I (1867) 257; N. Busch in Fl. cauc. crit. III, 4 (1910) 627.

Perennial; stem 17–40 cm high; leaves entire, the radical oblong, petiolate, the cauline lanceolate-linear. Sepals 7 mm long; petals yellow, 12 mm long; fruiting pedicels 1.5–4 mm long; silicles broadly elliptic or broadly ovate, densely covered with very short stellate hairs, 21–28 mm long, 15–22 mm broad; style 2–2.5 mm long; cells 5–6-seeded; seeds rust-brown, together with wing 6.5–13 mm in diameter, without wing 3–4 mm in diameter, wing alone 2–5.5 mm wide. May–June. (Plate XXII, Figure 1).

Caucasus: S. Transc. **Gen. distr.**: As. Min., Arm.-Kurd., Iran. Described from Asia Minor (Aman, between Suerek and Diarbeker) and Turkish Armenia (Mush). Type in Geneva.

3. **F. eriocarpa** Boiss., Fl. Or. I (1867) 258; N. Busch in Fl. cauc. crit. III, 4 (1910) 627. — Ic.: Deless., Ic. sel. II, tab. 34.

Perennial; stem 20—58 cm high; radical leaves oblong-lanceolate, dentate or eroded, cauline leaves oblong-linear. Sepals 5—6 mm long; petals yellow, 9—10 mm long; fruiting pedicels 1.5—4 mm long; silicles elliptic, 14—29 mm long, 7—13.5 mm broad, densely and long tomentose-villous; style 1.75—2.5 mm long; cells 8-seeded; seeds rust-brown, together with wing 5—6 mm long, 4.5—6 mm broad, without wing ca. 3 mm in diameter, wing alone 1.25—2 mm wide. April—May.

Calcareous and clayey dry slopes and rocks. — Caucasus: NW Caucasus. **Gen. distr.**: Cyprus, As. Min., environs of Artvin, Syria. Described from Cyprus. Type in Geneva.

4. **F. suffruticosa** (Vent.) Sweet, Hort. Brit. ed. I (1823) 467; N. Busch in Fl. cauc. crit. III, 4 (1910) 628. — Lunaria suffruticosa Vent., Jard. Cels. (1800) 19. — Farsetia suffruticosa DC., Syst. II (1821) 287. — Brachypus asper Ldb., Fl. Ross. I (1842) 133. 338

Perennial; crown covered with remnants of deciduous leaves, many-stemmed; stems erect, sparingly branched, 35—50 cm high; leaves lanceolate, acute, entire, the upper linear. Racemes elongating toward end; sepals 7—9 mm long; petals violet, 12—14 mm long; filaments dilated, sometimes the shorter dentate; fruiting pedicels 7—15 mm long; silicles with almost inconspicuous stalks [gynophores ?], glabrous, oboval to suborbicular, obtuse, sometimes sinuate, 12—17 mm long, 9—14 mm broad; style 5—7 mm long, readily breaking off (just above base); cells 2—4-seeded; seeds brown, together with wing 3.5—6 mm in diameter, without wing 2—3.75 mm in diameter, wing alone 1—2 mm wide. May. (Plate XXII, Figure 2).

Dry rocks and stony places. — Caucasus: S. Transc.; Centr. Asia: Mtn. Turkm. (Kopet-Dagh). **Gen. distr.**: Iran., Assyria (near border with Iran). Described from cultivated specimens. Type in London.

Genus 636. **BERTEROA** * DC.**

DC., Syst. II (1821) 290; Hayek, Crucif.-Syst. (1911) 243; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 566.

Sepals divergent, not saccate at base. Petals white, deeply bipartite. Longer filaments entire, the shorter dentate at base. A crescent-shaped nectariferous gland at both sides of shorter stamens. Median glands absent. Ovary sessile. Style elongated, stigma shortly 2-lobed. Fruit an elliptic or rotund bivalvular silicle with flat or convex valves. Fruit cells many-seeded. Septum delicate, without fibers, with numerous parallel walls of epidermal cells. Seeds flattened, marginate. Cotyledons flat. Embryo pleurorhizal. Hairs branched. Annual, biennial, or perennial herbs, with branching stems.

A genus of 7 species; 3 are native to the Soviet Union. A Mediterranean-Near Asian genus.

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* After the botanist Carlo Giuseppe Bertero.

** Treatment by N.A. Bush.

1. Silicles more or less inflated. Leaves lanceolate . . . . 2.
+ Silicles flattened, rounded, glabrous. Leaves rosulate, broadly spatulate, rhombic . . . . 3. **B. spathulata** (Steph.) C. A. M.
2. Silicles oblong-elliptic, pubescent. Seeds nearly wingless . . . . 1. **B. incana** (L.) DC.
+ Silicles broadly elliptic or oval, glabrous. Seeds winged . . . . 2. **B. ascendens** C. Koch.

339 1. **B. incana** (L.) DC., Syst. II (1821) 291; Ldb., Fl. Ross. I, 135; Shmal'g., Fl. I, 84; N. Busch in Fl. cauc. crit. III, 4 (1910) 619; Fl. Sib. et Or. Extr. VI (1931) 566 cum tab. geogr.; Kryl., Fl. Zap. Sib. VI (1931) 1372. – Alyssum incanum L., Sp. pl. (1753) 619. – Ic.: Rchb., Ic. Fl. Germ. tab. XXII, f. 4284. – Exs.: HFR No. 1652.

Biennial; whole plant covered with short stellate hairs and mixed with some simple hairs on stem and pedicels; stem erect, branching, 20–65 cm high; leaves lanceolate, entire or remotely dentate, sessile, the radical petioled. Raceme dense, elongating in fruit; sepals 3–3.5 mm long; petals 6–7 mm long, incised to one-third of their length; fruiting pedicels in fruit 6–8.5 cm long; silicles short-hairy, ellipsoidal or oblong, 6–9 mm long, 4–4.5 mm broad, convex; style 2–3 mm long; seeds marginate. May–June.

Steppes, hills and dry slopes, roadsides, fields, and fallows, up to 1,200 m. – European part: Lad.-Ilm., Dv.-Pech., V.-Kama, U. V., U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don, L. V., Crim.; Caucasus: Cisc., W. Transc. Dag.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb., T. Sh. **Gen. distr.**: Europe, except for north and central Scand., Great Britain, western France, the Iberian Peninsula. Described from Europe. Type in London.

2. **B. ascendens** C. Koch in Linnaea XV (1841) 257; N. Busch in Fl. cauc. crit. III, 4 (1910) 621. – B. mutabilis Rupr., Fl. Cauc. (1869) 105, non DC. – Exs.: Fl. Cauc. exs. No. 184 (sub B. mutabili).

Perennial; stem herbaceous or woody at base, ascending to erect, 35–60 cm high; leaves covered with appressed hairs and bristles, oblong-lanceolate, entire. Flowering racemes capitate, elongating in fruit; sepals 3.5–5 mm long; petals 6–7 mm long; filaments nearly equal, edentate; fruiting pedicels 8–12 mm long; silicles glabrous, broadly elliptic or oval, inflated (var. physocarpa S. et L.) or rather flattened (var. platycarpa S. et L.), 7–12 mm long, 4–8 mm broad; style 2–3.5 mm long; seeds rather broadly winged, ca. 3 mm in diameter. June.

Dry slopes, in rocky and weedy places, 250–1,000 m. – Caucasus: W. and E. Transc. **Gen. distr.**: Arm.-Kurd. Described from Lechkhum (Svanetiya). Type in Leningrad.

3. **B. spathulata** (Steph.) C. A. M. in Ldb., Fl. Alt. III (1831) 48; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 569; Kryl., Fl. Zap. Sib. VI (1931) 1373. – Alyssum spathulatum Steph. in Willd., Sp. pl. III (1800) 465. – Ic.: N. Busch, l.c., 569 et tab. geogr. 570.

Perennial, cespitose; rhizome stout, multicipital, brown; shoots covered
340 with remnants of old leaves; flowering stems low, 5–13 cm high, in fruit
12–28 cm high, covered with small stellate hairs; leaves silvery due to dense, fine stellate hairs, leaves of radical rosettes petiolate, spatulate, with

rhombic blade broader than long, cauline leaves linear-lanceolate. Sepals sparsely stellate-hairy, about 5 mm long, ca. 2 mm broad; petals white, obovate-cordate, 8–8.5 mm long, with a notch about 2 mm deep, broadest part of petals 4–4.5 mm; filaments winged edenticulate; fruiting pedicels 9–15 mm long; silicles 6.5–9.5 mm long, 5–8 mm broad; style 1.75–3 mm long; seeds ca. 4 mm long, ca. 3 mm broad, with a wide wing. April–May.

Rocky slopes of coniform peaks. – W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh., Dzu.-Tarb. Endemic. Described from Altai. Type in Berlin.

Genus 637. **ALYSSUM**[*] L.[**]

L., Sp.pl.(1753) 650; Gen.(1754) 722; J.Baumgartner, Die ausdauernden Arten Eualyssum (1907–1909); N.Busch in Fl.cauc.crit.III, 4 (1910) 552; Fl.Sib.et Or.Extr.VI (1931) 538.

Sepals erect or recurved, not saccate at base. Petals yellow or light straw-colored, entire or sinuate, gradually tapering into a claw. Filaments free, toothed or winged, rarely edentate or wingless. A semiglobular, triangular or (rarely) filiform, elongated nectariferous gland on both sides of shorter stamens. Median glands absent. Ovary sessile, style elongated, persistent. Stigma capitate, sinuate. Fruit a bivalvular, dorsally compressed, ovate, ellipsoidal or rounded silicle. Valves more or less convex or flat, slightly netted-veined. Septum thin, without midrib, cells with numerous slender, parallel dividing walls. Seeds one or two in each cell, sometimes winged; cotyledons flat, embryo notorrhizal. Hairs stellate, sometimes mixed with simple, appressed or spreading hairs. Annual, biennial, and perennial herbs or undershrubs, with entire leaves.

A predominantly Mediterranean genus of 100 species, 29 are represented in the USSR. In addition, 4 more species are noted in case they are found in the Soviet Union.

A. wierzbickii Heuff., A. edentulum W. et K., and A. pannonicum Jacq. were erroneously recorded for the Ukraine. A. alpinum Pall. and A. minutiflorum Boiss. were recorded from the Crimea and should be ignored, along with A. atlanticum Desf. ("in Rossia").

341 1. Perennials with woody rhizomes and few stems woody at base . . . 2.
+ Annuals with weakly developed rhizomes, stems not woody . . . . . 20.
2. Silicle more or less flattened, with 1-seeded or 2-seeded cells, inflorescence branching, corymbiform . . . . 3.
+ Silicle biconvex, with 2-seeded cells. Inflorescence a simple raceme . . . . 11.
3. Silicles glabrous . . . . 4.
+ Silicles covered with stellate hairs . . . . 9. **A. saxatile** L.
4. Silicles 6–11 mm long, cells usually 1-seeded . . . . 8. **A. peltarioides** Boiss.
+ Silicles 4.5 mm long, cells usually 2-seeded . . . . 5.

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[*] Word of obscure origin, possibly from the Greek a (without, not) and lyssa – frenzy.

[**] Treatment by N.A. Bush.

5. Upper leaves approximate to the dense and short inflorescence, bracteal . . . . 1. **A. bracteatum** Boiss. et Buhse.
+ Inflorescence ebracteate, not short . . . . 6.
6. Stem 20–50 cm high. Seeds broadly winged . . . . 6. **A. murale** W. et K.
+ Stem 5–35 cm high. Seeds wingless or with very narrow margin . . . . 7.
7. Silicles suborbicular, not flattened . . . . 7. **A. fedtschenkoanum** N. Busch.
+ Silicles flattened . . . . 8.
8. Leaves silvery-tomentose, spatulate-obovate, obtuse . . . . 9.
+ Leaves tapering at both ends . . . . 10.
9. Silicles obtusely truncate, cells 1-seeded (Crimea, Novorossiisk, NW Kuban) . . . . 4. **A. obtusifolium** Stev.
+ Silicles not truncate at apex, cells 2-seeded (Siberia) . . . . 5. **A. biovulatum** N. Busch.
10. Leaves oblong-obovate, the upper often lanceolate-linear, more or less gray due to stellate hairs. Silicles more or less broadly elliptic . . . . 2. **A. tortuosum** W. et K.
+ All leaves lanceolate-linear, silvery-tomentose. Silicles suborbicular . . . . 3. **A. artvinense** N. Busch.
11. Calyx in fruit long persistent. Petals 7 mm long . . . . 13. **A. calycocarpum** Rupr.
+ Calyx soon deciduous . . . . 12.
342 12. Silicles suborbicular or orbicular-ovate. Longer stamens 1–2-toothed . . . . 13.
+ Silicles ovate. Fruiting racemes generally short. Longer stamens edentate . . . . 14.
13. Plant 7–20 cm high. Pedicels and sepals without spreading, long, simple hairs. Whole plant with fine, appressed, stellate hairs . . . . 10. **A. gmelini** Jord. et Fourr.
+ Plant 20–50 cm high. Pedicels and sepals with long, spreading, simple hairs. Many-rayed stellate hairs on other parts of plant, longer than in A. gmelini. Flowering raceme long (up to 30 cm) . . . . 11. **A. trichostachyum** Rupr.
14. Pedicels and calyx scabrous with simple spreading hairs . . . . 15.
+ Pedicels and calyx covered with stellate hairs, sometimes long-rayed hairs . . . . 16.
15. Raceme short, umbellate. Style 2 mm long . . . 14. **A. andinum** Rupr.
+ Raceme longer, up to 5.5 cm. Style 2.75–3 mm long . . . . 15. **A. schemachense** N. Busch.
16. Gray plant with dense, long-rayed stellate hairs. Silicles oboval, sinuate at apex. Style 1.5–3.6 mm long . . . . . . 16. **A. lenense** Adams.
+ Silicles not sinuate, oval or broadly oval . . . . 17.
17. Fruiting raceme short, silicles densely pubescent. Dagestan . . . . 17. **A. daghestanicum** Rupr.
+ Fruiting raceme not short, silicles densely pubescent . . . . 18.
18. Leaves obovate-linear. Silicles 4–6 mm long, globular-ovate . . . . 18. **A. muelleri** Boiss.

+ Leaves narrow, linear . . . . 19.

19. Silicles 2–3 mm long, orbicular-ovate. Style 4–5 mm long. Stems loosely branching, sparingly leafy . . . . ★19. **A. armenum** Boiss.

+ Silicles 3–4 mm long, oval. Style shorter. Stems densely leafy. Cespitose . . . . ★21. **A. persicum** Boiss.

20. Calyx persistent in fruit . . . . 21.

+ Calyx soon deciduous . . . . 22.

21. Silicles glabrous . . . . 22. **A. minutum** Schlecht.

+ Silicles covered with fine stellate hairs . . . . 33. **A. calycinum** L.

343 22. Silicles glabrous . . . . 23. **A. desertorum** Stapf.

+ Silicles more or less covered with stellate, sometimes simple hairs . . . . 23.

23. Raceme short, even in fruit. Silicles congested in subumbellate racemes . . . . 24.

+ Fruiting raceme more or less long . . . . 25.

24. Upper leaves not overtopping or exceeding inflorescence, linear or linear-oblong. Seeds with very narrow wing (Crimea) . . . . 24. **A. umbellatum** Desv.

+ Upper leaves exceeding and overtopping inflorescence, oblong-spatulate. Seeds wingless . . . . . . 25. **A. marginatum** Steud. in Boiss.

25. Silicles imbricate at summit of the erect inflorescence, forming a very compact raceme . . . . 26.

+ Silicles and raceme not as above . . . . 27.

26. Stem, leaves, and silicles densely pubescent. Hairs 6–8-rayed (Talysh) . . . . 26. **A. szovitsianum** Fisch. et Mey.

+ Stem, leaves, and silicles rather sparsely pubescent. Hairs 4–6-rayed (Armenia and Karabakh) . . . . 27. **A. strictum** Willd.

27. Style ca. 3–4 mm long . . . . 28.

+ Style 0.75–1.8 mm long . . . . 29.

28. Plant 6–24 cm high. Fruiting raceme not long. Silicles oval, 5.5–7 mm long, 4.5–5 mm broad . . ★20. **A. macrostylum** Boiss. et Huet.

+ Plant 20–60 cm high. Fruiting raceme long, up to 20 cm. Silicles orbicular-ovate, 2.5–4.5 mm long and nearly as broad . . . . 12. **A. rostratum** Stev.

29. Silicles elliptic or oval. Filaments without wing-shaped appendages . . . . 32. **A. dasycarpum** Steph.

+ Silicles orbicular. Filaments with winged appendages . . . . 30.

30. Silicles covered only with branched (stellate) hairs . . . . 31.

+ Silicles with stellate and many simple (bristles) hairs borne on tubercles . . . . 28. **A. hirsutum** M. B.

31. Inflorescence pyramidal; stem branched already from base. Small plant . . . . 31. **A. buschianum** Grossh.

+ Inflorescence not pyramidal. Plant not as above . . . . 32.

344 32. Petals ca. 3 mm long. Filaments of longer stamens narrowly winged, 1-toothed. Silicles with short rays of hairs . . . . 29. **A. campestre** L.

+ Petals ca. 2 mm long. Filaments of longer stamens 1-toothed or toothless. Silicles with long rays of hairs . . . . 30. **A. parviflorum** M. B.

Section 1. **ODONTARRHENA** (C. A. M.) Koch, Synops. (1836) 59; Odontarrhena C. A. M. in Ldb., Fl. Alt. III (1831) 58 (pro gen.). — Filaments with teeth or appendages. Nectariferous glands hemispherical or pyramidal. Fruit flattened or convex, cells generally monospermous, rarely dispermous. — Perennials.

1. **A. bracteatum** Boiss. et Buhse, Aufz. (1860) 17; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1910) 558.

Perennial, canescent with scales; stems 9—23 cm high, undulate (curving), corymbose-paniculate; leaves obovate-orbicular, obtuse, the uppermost overtopping the short, corymbose, and compact racemes. Sepals 1.8—2 mm long; petals 2—2.5 mm long, pale yellow, cuneate, slightly sinuate; all filaments with nearly free appendages at base; silicles obovate-orbicular, ca. 3 mm long, ca. 2.5 mm broad, densely squamose; style 1.5—1.6 mm long; seeds wingless, rufous, ca. 1.5 mm long, ca. 1 mm broad. Fl. May—June, Fr. June—July.

Caucasus: S. Transc., Tal. **Gen. distr.**: Iran. Described from Nakhichevan, foot of Ilangli-Dag. Types in Leningrad and Geneva.

2. **A. tortuosum** W. et K., Pl. rar. Hung. I (1802) 94; DC., Syst. II (1821) 306; N. Busch in Fl. cauc. crit. III, 4 (1910) 558. — A. alpestre Shmal'g., Fl. I. (1895) 86; Kom., Fl. Manchzh. II (1903) 384 (non L.). — A. serpyllifolium var. longistylum Somm. et Lev., Enum. (1900) 43. — Odontarrhena alpestris Ldb., Fl. Ross. I (1842) 142. — O. obovata C. A. M. in Ldb., Fl. Alt. III (1831) 61; Ldb., Fl. Ross. I, 142. — O. microphylla C. A. M. in Ldb., Fl. Alt. III (1831) 63, p. p. — Ic.: W. et K., l. c., tab. 91; Rchb., Ic. Fl. Germ. tab. XX, f. 4276; Hegi, Ill. Fl. f. 873.

Perennial; stems woody at base, ascending or erect, tortuous, 8—30 cm high; leaves obovate-oblong or obovate, small (var. microphyllum (C. A. M.) N. Busch), orbicular-ovate (var. obavatum (C. A. M.) N. Busch), or oblong, the upper leaves often oblanceolate, always tapering toward base, gray with stellate hairs. Inflorescence branching, corymbiform-paniculate; sepals ca. 2 mm long; petals 2.5—3 mm, rarely up to 4 mm long (var. grandiflorum Rupr.), oboval, golden yellow; filaments of longer stamens with one-sided wing at the middle or slightly lower, wing adnate, free at apex; shorter filaments with appendage free from base; fruiting racemes rather
345 long, dense; silicles flattened, elliptic or obovate-elliptic, more or less grayish with stellate hairs, 2.5—4.5 mm long, 1.9—2.5 mm broad, sometimes 5—6 mm long, 2.5—3 mm broad (var. schirvanicum Rupr.); style 0.8—2 mm long (var. longistylum (S. et L.) N. Busch); seeds wingless, rust-brown, 1.25—1.5 mm long, 0.6—1.25 mm broad. April—June.

Dry slopes (especially limestone), dry hills, and stony and sandy places, to 2,300 m. — European part: Bl., L. Don, L. V., Transv., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.**: Centr. Eur. (Galicia, Hungary, Rumania), Bal.-As. Min., E. Med., Arm.-Kurd. Described from Hungary. Types in Vienna and Budapest.

Note. This species should not be confused with A. alpestre L., which is common to the Swiss and Dauphine Alps and is described in Reichenbach's Icon. Fl. Germ. tab. XX, f. 4275. The stems of A. alpestre L. are herbaceous, the leaves suborbicular or spatulate. A. alpestre was erroneously cited by many authors in the USSR. A. tortuosum W. et K.

is markedly polymorphous; many forms and varieties can be distinguished. Odontarrhena marschalliana C. A. M. Verz. (1831) 182 is probably synonymous with A. tortuosum W. et K.

★3. **A. artvinense** N. Busch in Fl. cauc. crit. III, 4 (1910) 566.

Perennial undershrub, gray with appressed stellate hairs; stems 6–10 cm high, ascending, rather densely leafy; leaves oblong-linear, subacute. Inflorescence somewhat branched or almost simple; sepals 2–2.5 mm long; petals yolk-yellow, sinuate, 3.5–4.5 mm long; filaments of longer stamens with one-sided wing almost at the middle, wing adnate, free only at tip; filaments of shorter stamens with appendage free from base; fruiting raceme dense, rather long; silicles suborbicular, 3 mm long, 2.5 mm broad, style 1.75–2.25 mm long. Fl. May–June, Fr. July.

Stony and rocky places. Common to the Artvin province of Turkey, but also encountered in W. Transc. Described from Artvin, Shurtum, Berta-Su River gorge. Type in Leningrad.

4. **A. obtusifolium** Stev. in DC., Syst. II (1821) 305 (partim); N. Busch Rhoead. in Fl. cauc. crit. III, 4 (1910) 567.

Perennial undershrub; silvery-gray with appressed, stellate, squamose hairs; stems ascending, 10–36 cm high; leaves broadly spatulate-obovate, the lower often suborbicular. Inflorescence corymbiform, many-branched; sepals ca. 2 mm long; petals 2.5–3, rarely up to 4 mm long, oboval, golden; filaments of longer stamens with lateral wing to or slightly lower than the middle, wing adnate, free at top, filaments of shorter stamens with appendage free from base; silicles 4–5 mm long, 3–3.5 mm broad, orbicular-obovate, 346 subtruncate at apex; style 0.8–1.8 mm long; seeds wingless, rufous, 1.75–2 mm long, 1–1.25 mm broad. Fl. April–May, Fr. May–June.

Dry slopes, calcareous rocks, sandy places, and steppes. — European part: Bl., Crim.; Caucasus: W. Transc. (Novorossiisk, Gelendzhik). Endemic. Described from southern Crimea. Types in Leningrad and Helsingfors.

Note. Phytogeographically, a Crimean-Novorossiisk type.

5. **A. biovulatum** N. Busch, nom. nov. — A. sibiricum N. Busch, Fl. Sib. et Or. Extr. VI (1931) 550; Kryl., Fl. Zap. Sib. VI (1931) 1364 (non Willd.). — A. alpestre et A. tortuosum (part.) auct. mult. rossicorum. — A. alpestre Kom., Fl. Manchzh. II (1903) 384 (non L.). — Odontarrhena microphylla C. A. M. in Ldb., Fl. Alt. III (1831) 63, part. — Ic.: N. Busch, Fl. Sib. et Or. Extr. VI (1931) 551 et tab. geogr. 555.

Perennial; stems ascending from prostrate base, branching above; leaves obovate or spatulate, obtuse, covered (together with stems and silicles) with fine stellate hairs, becoming silvery. Inflorescence corymbose-ramose; pedicels 6–14 mm long; sepals 2–2.5 mm long; petals yellow, entire, 3.5–5.5 mm long; silicles orbicular or elliptic, 3–4 mm in diameter or 4–5.5 mm long and 3–4 mm broad, sometimes 6–6.5 mm long, 4.75–5 mm broad (var. macrocarpum N. Busch), cells 2-seeded; seeds rounded-ellipsoidal, not marginate or reddish brown, 1.5–2 mm long, 1.1–1.5 mm broad; style 0.75–2 mm long. May–June.

Dry slopes and hills, often stony places, sometimes sandy parts of steppical plains. — Arctic: Arc. Sib.; W. Siberia: Ob; U. Tob., Irt., Alt.; E. Siberia: Yenis., Lena-Kol., Ang.-Say., Dau.; Far East: Okh., Ze.-Bu.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.**: Dzu.-Kash., N. Mong. Described from Siberia. Type in Leningrad.

Note. There are two minor varieties: the first is distinguished from the typical form by being smaller than usual in all parts (from leaves to silicles), i. e., the silicles are only 2—3 mm long and 1.5—2 mm broad (var. microphyllum (C. A. M.) N. Busch); the second grows in Arctic conditions and only its vegetative organs are reduced (var. arcticum N. Busch).

The species is from the large group of A. alpestre s. l.

6. **A. murale** W. et K., Pl. rar. Hung. I (1802) 5, tab. 6; N. Busch in Fl. cauc. crit. III, 4 (1910) 568. — A. argenteum Shmal'g., Fl. I (1895) 86. — Odontarrhena argentea Ldb., Fl. Ross. I (1842) 141, 753. — Exs.: Kerner, Fl. exs. Austro-Hung. 3273.

347 Perennial, gray with stellate appressed hairs, woody at base, many-stemmed; stems 20—60 cm high, ascending, pyramidally corymbose at summit; leaves obovate-oblong to lanceolate, densely covered underneath with gray scales. Sepals 2—2.25 mm long; petals golden-yellow, oboval, 3—4 mm long; filaments of longer stamens with one-sided wing, free and bidentate above, shorter stamens with free appendage; silicles orbicular or ovate-orbicular, flattened, squamose, 3—5 mm long, 3—4 mm broad, sometimes broadly oboval (var. reichenbachianum Rupr.); style 0.9—1.75 mm long; seeds broadly winged, together with wing 2.5—3 mm long, 2—2.5 mm broad. March—July.

Dry slopes and hills, up to 2,600 m. — European part: M. Dnp., Bl., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc. **Gen. distr.**: Bal.-As. Min., Med. (Centr. and E.), Arm.-Kurd., Iran. Described from Transylvania. Type in Vienna.

7. **A. fedtschenkoanum** N. Busch in Not. syst. Herb. H. B. Petropol. IV, 19—20 (1923) 145, cum icone; Kryl., Fl. Zap. Sib. VI (1931) 1366.

Perennial, woody at base, rootstock branched, long, plant silvery throughout with dense stellate hairs, with numerous basal shoots, erect or ascending; floriferous shoots thin, ca. 20—25 cm high, in fruit ca. 30—35 cm high; leaves orbicular-spatulate, dense, subimbricate. Inflorescence ramose, corymbose-paniculate; sepals covered with stellate hairs, ca. 2.75 mm long, ca. 1.25 mm broad; petals straw-colored, ca. 3.75 mm long, ca. 1—1.25 mm broad; filaments of longer stamens with large wing adnate to middle, filaments of smaller stamens with appendage adnate up to one-third of its length; nectariferous glands small, crescent-shaped, on both sides of shorter stamens; fruiting racemes rather long; pedicels 3—4 mm long; silicles suborbicular, silvery with stellate hairs, ca. 2 mm in diameter; epidermal cells of septum irregularly arranged, with straight walls; style 1.5—2 mm long; seeds wingless, rufous-brown, ca. 1.5 mm long, ca. 1 mm broad. June.

Sands of riverbanks. — W. Siberia: Irt.; Centr. Asia: Balkh. Endemic. Described from the district of Zaisan. Type in Leningrad.

8. **A. peltarioides** Boiss in Ann. Sc. Nat. Ser. II, 17 (1842) 158; Fl. Or. I (1867) 272; N. Busch in Fl. cauc. crit. III, 4 (1910) 572.

Perennial, woody at base; stems ascending, 23–40 cm high; leaves oblong-spatulate; sterile branches squamose-gray, the flower-bearing slightly longer, greenish. Inflorescence corymbose, corymbs – particularly the apical – short, even in fruit; sepals ca. 2.5 mm long; petals oboval, ca. 3.5 mm 348 long, golden yellow; filaments of longer stamens adnate up to one quarter of the length, with a wing two-thirds of the filament length; shorter stamens with a free, lanceolate appendage; silicles glabrous, flattened, membranous, oboval, 6–11 mm long, 5–8.5 mm broad; style 1–1.5 mm long; cells sometimes with 2 ovules; seeds narrowly membranous-winged, 2.5–2.8 mm long, 1.9–2.1 mm broad, dark brown. Fl. May–June, Fr. June–July.

2,200–2,600 m. – Caucasus: S. Transc. **Gen. distr.**: As. Min., Arm.-Kurd. Described from Turkish Armenia. Type in Geneva.

Section 2. **AURINIA** (Desv.) Koch, Synops. (1837) 58; Desv., Journ. bot. III (1814) 162 (pro gen.). – Filaments obtusely toothed at base. Nectariferous glands hemispherical or pyramidal. Silicles flat-convex or flattened, cells 2–6-seeded. – Perennials.

9. **A. saxatile** L., Sp. pl. (1753) 650; Shmal'g., Fl. I (1895) 86. – Aurinia saxatilis Desv., Journ. Bot. III (1813) 162; Ldb., Fl. Ross. I (1842) 136. – Ic.: Rchb., Ic. Fl. Germ. No. 4280; Hegi, Ill. Fl. 452, No. 1356. – Exs.: HFR No. 1456.

Perennial; stem woody at base, with drooping branches, bearing rosettes of leaves and floriferous shoots 15–30 cm long; leaves gray-tomentose, oblong-lanceolate, subobtuse, tapering into a petiole, entire or remotely toothed; cauline leaves few. Racemes short, arranged in a corymb; petals emarginate, 4 mm long; filaments of all stamens obtusely toothed at inner side of base; nectariferous glands hemispherical; silicles glabrous, elliptic or oboval, 4.5 mm long; style 4 times as long as silicle; seeds membranous at margin, usually 2 in each cell. April–May.

Rocks. – European part: M. Dnp., Bl., V.-Don. **Gen. distr.**: Centr. Eur., Bal. Described from Europe. Type in London.

Section 3. **EUALYSSUM** Griseb. Spicil. fl. rumel. I (1843) 274. – Filaments usually dentate or appendicled. Nectariferous glands hemispherical or pyramidal. Silicles convex, cells 2-seeded. – Annuals, perennials, or undershrubs.

10. **A. gmelini** Jord. et Fourr., Brev. pl. nov. fasc. II (1866) 8. – A. arenarium Gmel., Fl. Bad. 3 (1808) 36; Gorodetsk., Zap. Novor. Univ. 95 (1903) 446 (non Lois.). – A. montanum subsp. gmelini Thell. in Hegi, Ill. Fl. Mitt. Eur. 451, No. 1354. – A. montanum Ldb., Fl. Ross. I, 138 (part.); Shmal'g., Fl. I, 87, non L. – Exs.: Kleop., H. F. Ucr. No. 64.

Perennial; stem 5–25 cm high, branched at base, with decumbent and 349 ascending branches gray with fine stellate hairs; leaves oblong-obovate to oblanceolate. Racemes simple, elongating in fruit up to 10 cm; sepals ca. 3 mm long; petals ca. 6 mm long; longer stamens with long one-sided wing at upper part, 1–2-toothed; shorter stamens appendicled at base; fruiting pedicels subhorizontal; silicles rotund or oval, 3–4 mm long, emarginate at apex, covered with stellate scales; style ca. 3 mm long. April–June.

On sands and sandstone, rare. – European part: U. Dnp., M. Dnp., U. V., V.-Don, L. Don, Bl., Crim. **Gen. distr.**: Centr. Eur. (Germany, Austria, Czechoslovakia, Hungary, Bulgaria, Poland). Described from Baden, Germany.

11. **A. trichostachyum** Rupr., Fl. Cauc. (1869) 101, 290. – A. repens N. Busch in Fl. cauc. crit. III, 4 (1910) 573 (non Baumg.). – A. montanum Ldb., Fl. Ross. I (1842) 138 (part.). – A. montanum subsp. repens Shmal'g., Fl. I (1895) 87.

Perennial, more or less covered with stellate hairs, woody at base; stems erect or ascending, 20–50 cm high, sometimes only 7–13 cm high and raceme capitate (var. oschtenicum N. Busch); leaves obovate-oblong or obovate-lanceolate or the cauline leaves lanceolate. Pedicels and sepals with long, spreading, simple hairs; sepals 2.5–3 mm long; petals emarginate, golden-yellow or white (var. albiflorum N. Busch), 4.5–6 mm long, 3–3.5 mm broad, oboval, unguiculate; filaments of longer stamens denticulate above middle, filaments of shorter stamens appendicled, connate at base. Fruiting racemes elongated, ca. 15–30 cm long; silicles appressed-squamose, orbicular or orbicular-elliptic, obtuse or slightly emarginate, 3–6 mm long, 2.5–4.5 mm broad; style 1.5–3 mm long; seeds narrowly winged, rufous-brown, ca. 2.5 mm long, ca. 1.5 mm broad. May–June.

Steppes, dry hills, and slopes, from 0 to 2,300 m. – European part: Crim. (mountains); Caucasus: Cisc., W. and S. Transc., Tal. Endemic. Described from Ciscaucasia (Khasaut, Kislovodsk). Type in Leningrad.

12. **A. rostratum** Stev. in Mém. Acad. Pétersb. III (1809–1810) 295, tab. 15, f. 1; N. Busch in Fl. cauc. crit. III, 4 (1910) 578. – A. montanum subsp. rostratum Shmal'g., Fl. I (1895) 88. – Ic.: Rchb., Ic. Fl. Germ. tab. II, f. 4272.

Annual and biennial, gray with appressed, stellate hairs, without simple hairs; stems simple or sparingly branching, 20–60 cm high, branches ascending; lower leaves obovate-lanceolate, the middle and upper oblong-lanceolate. Flowering racemes dense, markedly elongating in fruit, up to
350 20 cm long; sepals 2.5–3 mm long; petals yolk-yellow, oboval, emarginate, 5–6 mm long; filaments of longer stamens winged, bidentate above middle, filaments of shorter stamens with bidentate appendage; fruiting pedicels ascending; silicles sparsely scaled, orbicular-obovate or orbicular-elliptic, 2.5–5.5 mm long, 2–5 mm broad; style 2–3 mm long; seeds winged at margin, 2 mm long, 1.5 mm broad. April–June.

Dry slopes and dry calcareous hills. – European part: Bl., L. Don, L. V., V.-Don, Crim. **Gen. distr.**: Transylvania, Rumania, Bal.-As. Min. Described from the southern Crimea. Type in Helsingfors.

13. **A. calycocarpum** Rupr., Fl. Cauc. (1869) 103, 291; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1910) 579.

Perennial, silvery-gray with appressed, stellate hairs, without simple hairs; stems straight, simple or branching, slender, ascending, 15–35 cm high, branches thin; all leaves obovate-lanceolate or obovate-spatulate.

Flowers relatively large; sepals ca. 4 mm long, persistent in fruit; petals yolk-yellow, up to 7 mm long; filaments of longer stamens acutely 2-toothed below apex; filaments of shorter stamens auricled at base to half the filament length; flowers spreading to ascending, sparingly pubescent; silicles large, 5–6.5 mm long, 4.5–6 mm broad, orbicular and emarginate, or orbicular-ovate and subacute at apex; style 2–3.5 mm long; seeds narrowly winged, rufous-brown, 3–3.5 mm long, ca. 3 mm broad. Fl. April, Fr. May–June.

Dry calcareous slopes. – European part: Crim. Endemic. Described from the Crimea. Type in Leningrad.

14. **A. andinum** Rupr., Fl. Cauc. (1869) 103; N. Busch in Fl. cauc. crit. III, 4 (1910) 580. – A. ruprechti Boiss., Fl. Or. Suppl. (1888) 51.

Perennial, cespitose plant; stems low, 3.5–15 cm high, simple, ascending, densely leafy; leaves scabrous with stellate and simple hairs, linear-spatulate. Racemes dense, corymbose; pedicels thin, scabrous – as well as calyx – with simple hairs; sepals ca. 3.5 mm long; petals 7–7.5 mm long, 3–3.5 mm broad, obcordate-ovate, emarginate, tapering into a filiform claw; filaments of longer stamens edentate, filaments of shorter stamens with one-sided teeth below middle; silicles canescent with stellate hairs, oval, 5–5.5 mm long, 3.25–3.5 mm broad; style 2 mm long. May–June.

Calcareous slopes. – Caucasus: Dag. Endemic. Described from Salatau, the summit of Khyrka Mountain 2,000 m and from Forel'noe Lake (Ezen-Am) 2,600 m. Type in Leningrad.

15. **A. schemachense** N. Busch, Fl. cauc. crit. III, 4 (1910) 581.

351 Perennial, cespitose plant; stems 6–10 cm high, simple, ascending; leaves silvery-gray with stellate, many-rayed, appressed hairs, narrowly spatulate-oblong, subacute at apex. Raceme 2–5.5 cm long in fruit; pedicels scabrous with simple hairs; silicles gray with fine stellate hairs, broadly oval, ca. 5 cm long, ca. 4 mm broad; style 2.75–3 mm long; seeds brown, broadly oboval, 2–2.5 mm long, 1.3–1.8 mm broad. Fr. July.

Stony places. – Caucasus: E. Transc. Endemic. Described from Dibrar Mountain in the Shemakha District, 1,300 m. Type in Leningrad.

Note. Eastern-Transcaucasian analogue of the Dagestan species A. andinum Rupr.

16. **A. lenense** Adams in Mém. Soc. Nat. Mosc. 5 (1817) 110; Shmal'g., Fl. I. (1895) 87; Kom., Fl. Manchzh. II (1903) 385; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 542; Kryl., Fl. Zap. Sib. VI (1931) 1363. – A. fischerianum DC., Syst. (1821) 311; Ldb., Fl. Ross. I (1842) 138. – Ic.: N. Busch, l. c., 542 et tab. geogr. 546.

Perennial, gray with dense, long-rayed, stellate hairs, sometimes intensely white; sometimes upper leaves and pedicels with hairs one ray of which much longer than the others, mixed even with simple hairs (among the stellate ones); stems woody at base, prostrate, many-branched, with tufts of simple, ascending, herbaceous stems 8–32 cm high, densely leafy, ending in flowering raceme; leaves oblong-linear, narrow-lanceolate or linear-cuneate, acuminate, tapering toward base, sometimes subimbricate, 5–17 mm long, 1–2.75 mm broad, sometimes broader: 3–4 mm. Raceme dense, short, 1.5–14 cm long at flowering; fruiting pedicels 5.5–9 mm long; sepals 3–3.8 mm long; petals yellow, 6–7 mm long, broadly oboval, sometimes slightly emarginate at apex, somewhat constricted below then tapering into a claw; filaments of longer stamens dilated, filaments of shorter stamens denticulate at base; silicles oboval or oblong-oval, 4–7 mm long, 3–5 mm broad, sometimes rotund and 3–3.5 mm in diameter (var. microcarpum N. Busch), emarginate at apex, glabrous (var. leiocarpum C. A. M.) or more or less densely covered with minute stellate hairs (var. dasycarpum C. A. M.), cells 2-, rarely 1-seeded; valves flat along margin, strongly convex in the middle; style 1.5–3 mm long, rarely 3–3.6 mm long (f. longistylum Rgl.); seeds reddish-grayish brown, 1.5–2 mm long, 1–1.75 mm broad. April–June.

Mainly steppical regions in sandy places, stony steppe, dry southern rocky, often calcareous slopes, and in river bedrocks. European part: V.-Kamạ, Transv.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Yenis., to 70°N., Ang.-Say., Lena-Kol., Dau.; Far East: Okh. **Gen. distr.**: N. Mong., Manchuria. Described from the Lena River. Type in Leningrad.

352 Note. A. lenense is the easternmost representative of A. montanum s. l. group, which comprises many Mediterranean, Central Europe, and Near Asian species. This group is extraordinarily polymorphous; all its species are highly variable.

17. **A. daghestanicum** Rupr., Fl. Cauc. (1869) 104; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1910) 581.

Perennial, cespitose plant, gray and scaly; stems 4–23 cm high, simple, densely leafy; leaves narrowly linear-spatulate. Racemes few-flowered, subumbellate, not elongating even in fruit; pedicels and calyx gray with stellate hairs, without simple hairs; sepals 2.5–3 mm long; petals straw-colored, 5–5.5 mm long, oboval, tapering into a filiform claw; filaments of longer stamens edentate, dilated gradually toward tip, filaments of shorter stamens with a short linear appendage; silicles oval, 4–5 mm long, 3.5–4.5 mm broad, covered with stellate hairs; style 2.25–2.75 mm long; seeds 0.9–1.75 mm long, 0.75–1.5 mm broad. Fl. May–June, Fr. June–July.

Dry rocks and slopes, 850–2,000 m. – Caucasus: Dag. Endemic. Described from the environs of the village of Kutushi, 1,200–1,400 m. Type in Leningrad.

Note. This species is distinguished by its smaller flowers, geographically separated from A. schemachense, and is distinguished from both A. andinum Rupr. and A. schemachense N. Busch by the absence of simple hairs.

18. **A. muelleri** Boiss., et Buhse in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 16; N. Busch in Fl. cauc. crit. III, 4 (1910) 582.

Perennial, undershrub, gray with squamose hairs; stems 10–17 cm high, ascending; leaves obovate-linear. Sepals ca. 3.5 mm long; petals oboval, 5–7 mm long, straw-colored, clawed; filaments of all stamens gradually tapering from base to apex; fruiting racemes short but not umbellate; pedicels ascending, gray with stellate hairs; silicles covered with scales, oval, 4.5–5.5 mm long, 3.25–4.5 mm broad, style 2.5–4 mm long; seeds brown, wingless, 1.8–2.5 mm long, 1.5 mm broad. Fl. April–May, Fr. June.

Caucasus: S. Transc. **Gen. distr.**: Arm.-Kurd., Iran. Described from Erevan (Kizyl-Dag) and Gamarlu. Cotype in Leningrad.

*19. **A. armenum** Boiss., Fl. Or. I (1867) 278; Grossg., Fl. Kavk. II, (1930) 211.

Perennial, gray with more or less appressed rather long-rayed stellate hairs, woody at base; stems rather loosely branching from base, fruitless shoots densely leafy, floriferous shoots not densely so, ascending, 5–15 cm long; leaves of floriferous shoots oblanceolate-linear, subacute, leaves of fruitless shoots narrowly linear; pedicels and calyx covered with squamose- 353 stellate hairs. Inflorescence a simple raceme; petals yolk-yellow, emarginate; filaments of shorter stamens each with very short tooth slightly higher than base, filaments of longer stamens edentate; silicles orbicular-ovate, ca. 2–3 mm long, downy, cells 2-seeded, valves convex, ca. 2–3 mm long; style 4–5 mm long.

Dry slopes. – **Gen. distr.**: Arm.-Kurd. (environs of Surmal). Described from Bayazet and Gemishkhane. Type in Geneva.

*20. **A. macrostylum** Boiss. et Huet in Boiss., Fl. Or. I (1867) 279; N. Busch in Fl. cauc. crit. III, 4 (1910) 582.

Annual, gray-hispid with branching spreading hairs; 6–24 cm high; branches prostrate to ascending; leaves obovate or oblong. Sepals 2.75–3.5 mm long; petals oblong-spatulate, entire, straw-colored, 5–6 mm long; filaments of longer stamens with a 1–2-toothed wing, filaments of shorter stamens with bifid appendage; fruiting pedicels spreading or recurved; silicles large, 5.5–7 mm long, 4.5–5 mm broad, finely hispid, oval; style 3–4 mm long; seeds wingless. May.

Rocks. – **Gen. distr.**: Arm.-Kurd. (Artvin province). Described from Erzurum. Cotype in Leningrad.

*21. **A. persicum** Boiss., Ann. Sc. Nat. (1842) 152; Fl. Or. I (1867) 279.

Perennial, silvery with squamose hairs, woody at base; stems erect, 25–30 cm high, sparingly branched; leaves oblong-lanceolate, obtuse. Sepals 4–4.5 mm long; petals lightly straw-colored, oboval, entire; filaments dilated at base, edentate; flowering raceme elongate, loose; pedicels 8–9 mm long, ascending, squamose; silicles orbicular or suborbicular, 5–7 mm in diameter; style 4.5 mm long, slender; seeds broadly marginate. **Gen. distr.**: Iran. Described from Iran near Isfahan. Cotype in Leningrad.

Note. Described in case it might be found in the USSR. In the Flora of the Caucasus, II (1930) 211, Grossheim recorded A. persicum from Artvin province in Turkey but based his conclusion on an erroneous determination. It may be that A. persicum grows in Artvin province, but Grossheim's specimen was another plant – small, forming compact tufts, with very narrowly linear acute leaves and a short style. (Specimen without fruit.)

22. **A. minitum** Schlecht. pater ex DC., Syst. II (1821) 316; Ldb., Fl. Ross. I 354 (1842) 140; Shmal'g., Fl. I (1895) 89; N. Busch in Fl. cauc. crit. III, 4 (1910) 583. – A. potemkini Akinf., Rast. Ekaterinosl. 2 (1889) 20. – Exs.: HFR XVII No. 803.

Annual, squarrose-pubescent with stellate hairs, 5–12 cm high, branching from base; leaves obovate or oblong-elliptic or oblanceolate. Sepals persistent; fruit lightly straw-colored, linear, emarginate, 2.3–3 mm long; filaments of longer stamens with an abruptly tapering wing, shorter stamens with oblong appendage; fruiting racemes slightly elongating; pedicels ascending to subhorizontal, longer than silicles; silicles glabrous, suborbicular, emarginate, 3–4 mm in diameter; style 0.5–0.75 mm long, with few branched hairs at base; seeds with a very narrow membranous wing, rufous, 1.5–1.7 mm long, 1–1.2 mm broad. March–May.

Rocky and sandy places. – European part: M. Dnp., Bl., V.-Don, L. Don, Crim.; Caucasus: Cisc., E., and S. Transc. **Gen. distr.**: Rumania, Bal.-As. Min. Description based on a specimen reported from Siberia but which, in all likelihood, is from the Crimea. Type in Berlin.

23. **A. desertorum** Stapf in Denkschr. Akad. Wien. (1886) 33; N. Busch in Fl. cauc. crit. III, 4 (1910) 584; Fl. Sib. et Or. Extr. VI (1931) 540 cum tab. geogra.: Kryl., Fl. Zap. Sib. VI (1931) 1367. – A. minimum Willd., Sp. pl. III (1800) 464; Ldb., Fl. Ross. I (1842) 140; Shmal'g., Fl. I, 89, non L. – Ic.: C. A. M. in Bull. Acad. Pét. VII, tab. 2; Rchb., Ic. Fl. Germ., tab. 18, fl. 4268; N. Busch, Fl. Sib. et Or. Extr. VI (1931) tab. geogr. 540. – Exs.: HFR No. 603.

Annual, grayish with stellate hairs, branching from base, 4–20 cm high; leaves linear-oblong, tapering toward base. Sepals reddish, soon deciduous, 1.5–2 mm long; petals linear-oblong, emarginate, rarely obtuse, pale yellow, white post anthesis, 2.5–3 mm long; longer filaments dilated below into a wing, the shorter 2-toothed; fruiting raceme elongate, compact; pedicels ascending, 2–3.5 mm long; silicles glabrous, orbicular, emarginate at apex, convex, flattened at margin, 3–4.5 mm in diameter, style 0.5–0.75 mm long; seeds narrowly marginate, rufous, 1–1.4 mm long, 0.9–1.25 mm broad. April–June.

Steppes, dry hills and slopes, solonetzic places, dry pastures, roadsides, and at borders of crops, up to 1,700 m. – European part: U. Dnp., U. V., V.-Kama, M. Dnp., V.-Don, Transc., Bl., L. Don, L. V., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Dau.; Centr. Asia: Dzu.-Tarb., Ar.-Casp., Kara K., Kyz. K., Balkh. **Gen. distr.**: Centr. Eur., Bal.-As. Min., Med. (east), Arm.-Kurd., Iran., Ind.-Him., Dzu.-Kash., Mong. Described from Europe. Type in London.

355 Note. Species of Central Asian origin. The epithet minimum has the priority, but in the Linnaean Herbarium, the specimen under this name is actually Koniga maritima R. Br. For that reason, Stapf renamed the species, A. desertorum.

24. **A. umbellatum** Desv., Journ. Bot. III (1814) 173 et 184; DC., Syst. II (1821) 312; Ldb., Fl. Ross. I (1842) 139; Shmal'g., Fl. I, 88; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1910) 588. – A. brachystachyum M. B., Fl. taur.-cauc. III (1819) 434.

Annual, short-scabrous with stellate hairs, branching from crown; stems 5–10 cm high, branches almost simple; leaves linear or oblong-linear. Racemes short, subumbellate; sepals up to 2 mm long; petals oblong-linear, emarginate, very pale, 3 mm long; filaments of longer stamens with truncate wing, sometimes ending in a tooth, filaments of shorter stamens furnished at base with a wide, petaloid, bipartite appendage; fruiting racemes remaining short, umbellate; silicles scabrous with stellate hairs, oval, 4–5 mm long, ca. 3.25 mm broad; style 1–1.2 mm long; seeds with a very narrow rim. Fl. April–May, Fr. May–June.

Dry slopes and hills and stony places. – European part: Crim., L. Don (?). **Gen. distr.**: As. Min., Syria. Described from the southern Crimea. Type in Paris.

Note. An East Mediterranean species, one of those which are indicative of the connection between the floras of the Crimea and Asia Minor.

25. **A. marginatum** Steud. in Boiss. Ann. Sc. Nat. (1842) 157; Fl. Or. I (1867) 282. – A. cryptopetalum Bge. in Arb. Naturf. Riga I (1847) 142.

Annual, gray, small plant, branching from base; leaves oblong-spatulate, obtuse, the uppermost enveloping and overtopping the raceme. Pedicels minute; petals very pale, linear-cuneate, sometimes shorter than calyx (var. cryptopetalum (Bge.) N. Busch); filaments of longer stamens appendicled, abruptly tapering, sometimes ending in a tooth, filaments of shorter stamens with a short appendage at base; fruiting raceme very short, oval; silicles subimbricate, covered with squamose hairs, oval, emarginate; stigma subsessile; seeds wingless. March–April.

Dry rocks slopes. – Centr. Asia: Ar.-Casp., Kara K., Kyz. K. **Gen. distr.**: Sinai, Iran., Ind.-Him. Described from Sinai. Type in Leningrad.

26. **A. szovitsianum** Fisch. et Mey. in Ind. sem. H. Petr. IV (1837) 31; Ldb., Fl. Ross. I (1842) 139; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1910) 590.

356 Annual, gray and appressed-hairy, 5–11 cm high, branching from crown; branches ascending, simple; leaves oblong-linear. Sepals 1.5 mm long; petals straw-colored, narrowly linear-cuneate, 2 mm long; filaments of longer stamens dilated into an abruptly tapering edenticulate wing, filaments of shorter stamens with short adnate appendage; fruiting racemes elongate, short-cylindrical, dense; silicles imbricated, covered with scales, oval, not emarginate, 4.5–5 mm long, 3–4 mm broad; style 0.5–0.75 mm long; seeds narrowly marginate. Fl. April–May, Fr. May–June.

Dry, stony, and sandy places. – Caucasus: Tal. **Gen. distr.**: As. Min., Iran, Syria. Described from northern Iran. Type in Leningrad.

27. **A. strictum** Willd., Sp. pl. III (1800) 464; N. Busch in Fl. cauc. crit. III, 4 (1910) 590.

Annual, gray with spreading 4–6-rayed hairs, 6–30 cm high; stem branching from base, branches slender, many, ascending; leaves rather broadly oblong-linear, obtuse. Petals oblong-lanceolate, straw-colored; filaments of longer stamens with 2 rather long teeth, filaments of shorter stamens appendicled at base, denticulate at tip; fruiting racemes 3.5–14 cm long, slender, cylindrical; silicles imbricate, overlapping each other, rough from spreading 4–6-rayed hairs, oval, entire, 4–5 mm long, 3–5 mm broad; style 0.5–0.75 mm long; seeds rufous-brown, narrowly marginate, 2–2.5 mm long, 1.5–1.75 mm broad. Fl. May.

Dry, stony slopes. – Caucasus: S. Transc. **Gen. distr.**: As. Min., N. Syria, Arm.-Kurd. Described from Armenia. Type in Berlin.

28. **A. hirsutum** M. B., Fl. taur.-cauc. II (1808) 106; III (1819) 433; Ldb., Fl. Ross. I (1842) 141; N. Busch in Fl. cauc. crit. III, 4 (1910) 597. – A. campestre subsp. hirsutum Shmal'g., Fl. I (1895) 88. – Ic.: Deless., Icon. sel. II, tab. 40.

Annual, with long spreading, stellate hairs; stems rather erect, branching, 6–36 cm high; leaves oblong-lanceolate. Sepals 2–3.5 mm long; petals straw-colored, bifid, 3–5 mm long; filaments of longer stamens broadly winged, 1-toothed, filaments of shorter stamens broadly appendicled at base; fruiting racemes elongated; pedicels ascending; silicles orbicular, 5–7 mm in diameter, scabrous with stellate and long simple basally tubercled hairs; style 1.25–2.5 mm long; seeds narrowly marginate, brown, rotund, 1.75–2.5 mm in diameter. April–May.

Steppes, dry hills and slopes, up to 1,500 m. – European part: M. Dnp., Bl., 357 V.-Don, L. Don, Crim.; Caucasus: Cisc., W., E., and S. Transc. **Gen. distr.**: Bal.-As. Min., Med. (east), Arm.-Kurd., Iran. Described from the Crimea and Georgian SSR. Type in Leningrad.

29. **A. campestre** L., Syst. ed. X (1758–1759) 1130; Ldb., Fl. Ross (1842) 141; Shmal'g., Fl. I (1895) 88; N. Busch in Fl. cauc. crit. III, 4 (1910) 591; Kryl., Fl. Zap. Sib. VI (1931) 1368. – Ic.: Sibth. et Sm., Fl. Graeca, tab. 626; Rchb., Ic. Fl. Germ. tab. XVIII, f. 4270.

Annual, scabrous with short stellate hairs, gray or yellowish, branching from base, 6–28 cm high; branches usually many, ascending; lower leaves obovate-oblong, the rest oblong-lanceolate. Sepals 1.75–2 mm long; petals bifid, straw-colored, 3 mm long; filaments of longer stamens narrowly winged, 1-toothed, filaments of shorter stamens with winglike, 2-toothed appendage; fruiting raceme elongated; pedicels ascending; silicles orbicular, covered with stellate, short-rayed hairs, 3.5–4.5 mm in diameter; style 1 mm long; seeds narrowly marginate, brown, 1.75–2 mm long, 1.25–1.3 mm broad. March–June.

Dry hills, slopes, and fields, up to 2,300 m. – European part: Bl., V.-Don, L. Don, L. V., Crim.; Caucasus: Cisc., W., E., and S. Transc., Dag., Tal.; W. Siberia: Irt.; Centr. Asia: Ar.-Casp., Kyz. K., Kara K., Balkh., T. Sh., Pam.-Al. **Gen. distr.**: Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Europe. Type in London.

30. **A. parviflorum** M. B., Fl. taur. cauc. III (1819) 434; Rupr., Fl. Cauc. (1869) 105. – A. micranthum Fisch. et Mey., Ind. I sem. H. P. (1835) 22; Ldb., Fl. Ross. I, 140. – A. campestre var. parviflorum Shmal'g., Fl. I (1895) 88; N. Busch in Fl. cauc. crit. III, 4 (1910) 593. – A. micropetalum Fisch. in DC., Syst. II (1821) 313; Ldb., Fl. Ross. I (1842) 139.

Annual, scabrous with stellate hairs, grayish with a yellowish shade; stems branching from base, 8–40 cm high, branches usually many, ascending; lower leaves obovate-oblong, the rest oblong-lanceolate. Sepals 1.5–1.75 mm long; petals bifid, straw-colored, 2–2.5 mm long; filaments of longer stamens 1-toothed or edentate, filaments of shorter stamens with winglike, 2-toothed appendage; fruiting raceme elongated; pedicels ascending; silicles rotund, 4.5–6 mm in diameter, covered with long-rayed stellate hairs; style 0.75–1 mm long; seeds brown, 2 mm long, 1.25–1.5 mm broad. April–May.

Stony and sandy places, steppes, dry hills and slopes, up to 1,500 m. – European part: Crim.; Caucasus: Dag., W., E., and S. Transc., Tal.

Gen. distr.: Bal.-As. Min., Med. (east), Arm.-Kurd., Iran. Described from the central Georgian SSR. Type in Leningrad.

358 31. **A. buschianum** Grossh. in Fl. Kavk. II (1930) 208.

Annual, small plant, 2–10 cm high; leaves obovate-oblong. Inflorescence pyramidal with elongated, erect, main branch and short, subhorizontal lateral branches, starting nearly from stem base; silicles orbicular, 3–3.5 mm in diameter, covered with short stellate hairs; style 1–2 mm long. April–May.

Dry slopes. – Caucasus: S.Transc.(Nakhichevan Autonomous SSR). Endemic. Described from the Nakhichevan ASSR. Type in Leningrad.

Section 4. **PSILONEMA** (C. A. M.) Hook. f. in Benth.-Hook., f., Gen. pl. I (1862) 74. – Psilonema C. A. M. in Ldb., Fl. Alt. III (1831) 50 (pro gen.). – Filaments edentate. Nectariferous glands filiform, elongated. Silicle convex, cells 2-seeded. – Annuals.

32. **A. dasycarpum** Steph. in Willd., Sp. pl. III (1800) 469; Shmal'g., Fl. I (1895) 89; N. Busch in Fl. cauc. crit. III, 4 (1910) 600; Kryl., Fl. Zap. Sib. VI (1931) 1369. – Psilonema dasycarpum C. A. M. in Ldb., Fl. Alt. III (1831) 51; Ldb., Fl. Ross. I (1842) 137. – Ic.: Ldb., Ic. pl. Fl. Ross. tab. 22.

Annual, densely stellate-hairy, 10–24 cm high: stem usually branching, erect; leaves entire, obovate to obovate-oblong, subacute at apex. Racemes dense; sepals deciduous in fruit; petals sublinear, very pale, 2.75 mm long; nectariferous glands minute; pedicels ascending; silicles downy, ellipsoidal or orbicular-ovate, convex, 3–3.5 mm long, 2.5–3 mm broad; style 1.5–1.8 mm long; seeds wingless, rufous, 1.25–1.5 mm long, 0.9–1 mm broad. March–May.

Stony and clayey dry places. – European part: L. V., Transv.: Caucasus: S. Transc., Tal.: W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.**: Iran., Ind.-Him., Dzu.-Kash. Described from the Lower Volga (Astrakhan). Types in Leningrad and Berlin.

33. **A. calycinum** L., Sp. pl. ed. 2 (1763) 908; Shmal'g., Fl. I (1895) 89; N. Busch in Fl. cauc. crit. III, 4 (1910) 601. – Psilonema calycinum C. A. M. in Bull. Acad. Pétersb. VII (1840) 132; Ldb., Fl. Ross. I (1842) 137. – Ic.: Jacq., Fl. Austr. tab. 338; Rchb., Ic. Fl. Germ. f. 4269. – Exs.: Rchb., Fl. Germ. exs. No. 2077.

Annual; stem 5–34 cm high, branching, stem and leaves gray with stellate hairs; lower leaves obovate-oblong, the rest oblong-lanceolate, tapering toward base. Raceme elongating in fruit; sepals persistent in fruit, 2–2.5 mm long; petals very pale, whitish post anthesis, sublinear, 3.25–4 mm
359 long; nectariferous glands subulate; fruiting raceme 2–15 cm long; silicles downy with minute stellate hairs, orbicular, emarginate, rather flattened along margin, convex in center, 3–4 mm, rarely 4.5 mm in diameter; style 0.3–0.6 mm long; seeds rufous, narrowly marginate, 1.5–2 mm long, 1.1–1.5 mm broad. Fl. April–June.

Steppes, dry hills and slopes, roadsides, and fields, 0–2,000 m. – European part: U. Dnp., M. Dnp., Bl., U. V., V.-Don, L. Don, L.V., Crim.; Caucasus: Cisc., Dag., W., S., and E. Transc., Tal. **Gen. distr.**: nearly all Eur., As. Min., Syria, Arm.-Kurd., Iran. Introduced into N. Am. Described from Europe. Type in London.

Genus 638. **MENIOCUS** * DESV.**

Desv.in Journ.Bot.III (1814) 173.— Alyssum sect. Meniocus Hook.f.in Benth.et Hook. f., Gen.pl. I (1862) 74.

Sepals erect, not saccate at base. Petals straw-colored, entire; filaments denticulate. A hemispherical, angular, nectariferous gland on both sides of shorter stamens. Median glands absent. Ovary sessile, style short. Fruit a perfect, flattened broadly elliptic silicle, dehiscing by 2 valves. Valves slightly netted-veined. Septum thin, with numerous parallel walls of cells without median strand. Seeds flattened, 4—8 in each cell. Cotyledons flat, embryo notorrhizal. Hairs stellate. — Annuals.

A Mediterranean-Near Asian genus of 6 species, only one of which is native to the USSR.

1. **M. linifolius** (Steph.) DC., Syst. II (1821) 325; Ldb., Fl. Ross. I (1842) 134, 752; Shmal'g., Fl. I (1895) 85; N. Busch in Fl. cauc. crit. III, 4 (1910) 607; Fl. Sib. et Or. Extr. VI (1931) 558 cum tab. geogr.; Kryl., Fl. Zap. Sib. VI (1931) 1369. — Alyssum linifolium Steph. ex Willd., Sp. pl. III (1800) 467. — Alyssum cupreum Freyn et Sint. in Bull. Herb. Boiss. (1903) 695. — Ic.: Delessert, Ic. sel. II (1823) tab. 42. — Exs.: HFR No. 957.

Annual, with whitish or stellate hairs; stem slender, branching, 6—30 cm high; leaves cuneate-linear, entire. Raceme loose; sepals 1.5—2 mm long; petals pale yellow, linear-cuneate, 2—3 mm long; filaments of all stamens long-toothed; fruiting pedicels 2.5—7 mm long; silicles completely flattened, glabrous, broadly elliptic, 4—7 mm long, 3—4.5 mm broad, sometimes 4 mm long and 3.25 mm broad (var. microcarpus N. Busch); style 0.3—0.5 mm long, cells 4—8-seeded, septum nerveless with epidermal cells transversely linear, thin; seeds rufous, 1.3 mm long, 0.8—0.9 mm broad, broadly elliptic. March—May.

360 Steppes, dry slopes and hills, stony places, roadsides, and fields. — European part: M. Dnp., V.-Kama, V.-Don, Transv., Bl., L. Don, L. V., Crim., U. V. (introduced); Caucasus: Cisc., Dag., E., and S. Transc., Tal.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Kara K., Kyz. K., Amu D., Syr D., Balkh., Dzu.-Tarb., T. Sh., Pam.-Al., Mtn. Turkm. Gen. distr.: Med., Centr. Eur. (eastern), Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Dzu.-Kash., Mong. Introduced into Australia. Described from Illyria. Type in Berlin.

Genus 639. **PTILOTRICHUM** † C. A. M.††

C.A.M. in Ldb., Fl.Alt.III (1831) 64; Hayek, Crucif.-Syst. (1911) 245; N.Busch, Fl.Sib. et Or.Extr. VI (1931) 559.

Sepals erect, not saccate at base. Petals white or pinkish, tapering into a claw. Filaments simple, edentate. A large nectariferous gland on both sides of shorter stamens, triangular, elongate outside, acuminate. Median glands absent. Ovary sessile, style short, stigma retuse, shallowly 2-lobed.

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* From the Greek men — month.

** Treatment by N.A. Bush.

† From the Greek ptilon — feather and thrix — hair, i.e., plant with pinnate hairs.

†† Treatment by N.A. Bush.

Fruit a rounded or broadly oval, bivalvular silicle, compressed from back, with flat or convex valves. Septum delicate, without fiberous strands or with a weakly developed marginal network of veins, and with numerous parallel walls of epidermal cells. Seeds 2 in each cell, flattened, sometimes marginate; cotyledons flat. Embryo pleurorhizal. Hairs stellate or bipartite. — Undershrubs with ebracteate flowering racemes and entire leaves.

A Mediterranean-Near Asian genus, represented in the USSR by 2 species out of 13.

1. Leaves linear-oblong. Flowering raceme dense, short. Petals 3 mm long. Small plants, 2–5 cm high . . . . 1. **P. canescens** C. A. M.
+ Leaves linear, tapering toward base. Flowering raceme elongated. Petals 4–5.5 mm long. Plant higher, 10–22 cm long . . . . 2. **P. elongatum** C. A. M.

1. **P. canescens** C. A. M. in Ldb., Fl. Alt. III (1831) 64; Fl. Ross. I (1842) 143; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 560. — Alyssum canescens var.
361 abbreviatum DC., Syst. II (1821) 322. — Ic.: Ldb., Ic. pl. Fl. Ross. tab. 273; N. Busch, l. c., 561 et tab. geogr. 562.

Undershrub 2–5 cm high, silvery with dense stellate hairs with pinnate rays; shoots woody at base, densely leafy; leaves linear-oblong, 6–8 mm long, ca. 1.5 mm broad, obtuse. Flowering racemes simple, dense, short, slightly elongating in fruit; sepals 1.5–2 mm long; petals white, 3 mm long, rounded, rather long-clawed; silicles 3–5 mm long, 2–3.5 mm broad, elliptic, densely covered with stellate hairs; style 0.8–1.5 mm long. May–June.

Dry stony places. — W. Siberia: Alt. (Chuya steppe and Dzhelo Mountain pass), Irt. (foot of Altyn-Tyube Mountain); Centr. Asia: Balkh., Dzu.-Tarb. **Gen. distr.**: Tib. Described from stony places in the Chuya steppe and foot of Altyn-Tyube Mountain. Type in Leningrad.

2. **P. elongatum** C. A. M. in Ldb., Fl. Alt. III (1831) 66; Fl. Ross. I (1842) 143; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 562; Kryl., Fl. Zap. Sib. VI (1931) 1371. — Alyssum canescens var. elongatum DC., Syst. II (1821) 322. — Ic.: Ldb., Ic. pl., Fl. Ross. tab. 275; N.Busch,l.c., 564 et tab. geogr. 565.

Undershrub gray with stellate hairs with pinnate rays; shoots woody at base, 10–22 cm long, less densely covered than the preceding; leaves sublinear, tapering at base, to 2 cm long (15–20 mm), 1–1.5 mm broad, rarely broader (var. latifolium N. Busch). Flowering racemes elongated; sepals up to 3 mm long; petals white, 4–5.5 mm long; silicles elliptic or oval, not as densely pubescent as the preceding species, 4–5 mm long, 3–4 mm broad; style 2–4.5 mm long. May–June.

Dry stony places. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau. **Gen. distr.**: Mong. Described from Charysh (Altai). Type in Leningrad.

Genus 640. **VESICARIA** * ADANS.**

Adans., Fam.d.pl.II (1763) 420; N.Busch in Fl.cauc.crit.III, 4 (1910) 629.

Sepals erect, not saccate. Petals long-clawed, yellow. Filaments somewhat dilated at base, edenticulate. A low, triangular, nectariferous gland on both sides of shorter stamens. Ovary sessile, style thin. Stigma obtuse, shallowly 2-lobed. Fruit an ovate silicle, slightly compressed from back, with strongly convex, netted-veined, pergameneous valves, tapering abruptly at base into a short pedicel. Septum hyaline-membranous. Epidermal cells slightly elongated, with sinuate walls. Fruit cells 4–6-seeded. Seeds flat, with coriaceous wing; cotyledons flat, embryo pleurorhizal. Sparsely pubescent with branching hairs. – Perennials with entire subglabrous leaves. 362

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* From the Latin vesica — vesicle.

** Treatment by N.A. Bush.

A genus of four Mediterranean, Central European and Arctic species, two of which grow in the USSR.

1. Flowers large; petals 16–18 mm long. Silicles large: 11–15 mm long, 10–12 mm broad. Style 7–10 mm long, deciduous .... 1. V. graeca Reut.
+ Flowers smaller; petals 5–6 mm long. Silicles smaller: hemispherical, up to 8 mm in diameter. Style 1.5–2 mm long, persistent .... 2. V. leiocarpa (Trautv.) N. Busch.

Note. The disjunctive distribution area of this genus comprises Central Europe (V. utriculata DC.), the Mediterranean area and western Transcaucasia (V. graeca Reut.), subarctic regions of East Siberia (V. leiocarpa (Trautv.) N. Busch), and North America and Greenland (V. arctica (Horn.) Richards.).

1. **V. graeca** Reut. in Cat. Hort. Genev. (1858) ex Boiss., Fl. Or. I (1867) 262; N. Busch in Fl. cauc. crit. III, 4 (1910) 630. – Ic.: Sibth. et Sm., Ic. Fl. Graec. tab. 607 (sub Alysso utriculato).

Perennial, woody at base, 22–30 cm high, branching; leaves of fruitless shoots dense, oblong-spatulate, subacute, appressed-hairy, 2–4-partite, leaves of floriferous shoots sessile, upright, acute, ciliate at margin, often dentate, all unicolored. Sepals 9–10 mm long; petals 16–18 mm long; blade yellow, broadly elliptic; fruiting pedicels 8–9 mm long, ascending; silicles glabrous, broadly elliptic or hemispherical, 11–15 mm long, 10–12 mm broad; style 7–10 mm long; cells 3–5-seeded; seeds brown, 2–3 mm in diameter, marginate with slightly undulate wing 0.7–1 mm broad. April. (Plate XXII, Figure 5).

Rocks. – Caucasus: W. Transc. **Gen. distr.**: Med., Bal.-As. Min., Arm.-Kurd. Described from Greece. Type in Geneva.

2. **V. leiocarpa** (Trautv.) N. Busch, comb. nova. – V. arctica ssp. leiocarpa Trautv. in A. H. P. V, I (1877) 19; N. Busch, Fl. Sib. et Or. Extr. VI (1931) 571. – Ic.: N. Busch, l.c., 572 et tab. geogr. 573.

Perennial, cespitose plant; gray with appressed stellate-multipartite hairs; rhizome stout, covered with remnants of old radical leaves; stems simple, erect, 5–20 cm long, strongly exceeding radical leaves, generally few-flowered, rarely 1-flowered; leaves obtuse, the radical oblong-spatulate, tapering into a long petiole, together with petiole 2–6 cm long, cauline leaves linear, smaller than the radical. Racemes short, ebracteate; pedicels ascending, sometimes to 3 cm long in fruit; sepals deciduous, oblong-ovate, ca. 4 mm long, ca. 2 mm broad, the outer with appressed stellate hairs; 363
petals oboval, short-clawed, very slightly emarginate, 5–6 mm long, 3–3.5 mm broad; silicles hemispherical, to 8 mm long, glabrous or very rarely sparsely

covered with stellate hairs; valves convex, rigid; septum nerveless, mostly perforated; style persistent in fruit, 1.5–2 mm long, thin; stigma capitate, thicker than style; seeds pendulous, broadly oboval, 2–3 mm long; funicle adnate to septum at base. June–July.

Limestone in mountains. – E. Siberia: N. Lena-Kol. Endemic. Described from East Siberia (Velingna, Upper and Middle Maigda, Alakit, and Khurak rivers). Type in Leningrad.

Note. This species is close to V. arctica but is distinguished by its glabrous fruit and is endemic to the northern part of the forest belt of Yakutia.

Genus 641. **PHYSOPTYCHIS** * BOISS.**

Boiss., Fl.Or.I (1867) 160; Hayek, Crucif.-Syst. (1911) 246.

Sepals erect, not saccate. Petals clawed, yellow. Shorter filaments denticulate, long, simple. A crescent-shaped nectariferous gland on both sides of shorter stamens, with a short outer appendage directed toward the longer stamens. Ovary sessile. Style long, with capitate stigma. Fruit a spherical inflated silicle, with thin, coriaceous, netted-veined valves. Septum with numerous parallel dividing walls of epidermal cells. Seeds many in each cell. Cotyledons flat, embryo pleurorhizal. – Densely tomentose with stellate hairs, cespitose high-mountain plants.

Two species, one of which grows in the alpine zone of the Nakhichevan ASSR and Iran, the other native to eastern Anatolia.

1. **P. gnaphalodes** (DC.) Boiss., Fl. Or. I (1867) 260. – Alyssum gnaphalodes DC., Syst. II (1821) 311. – Vesicaria gnaphalodes Boiss., Ann. Sc. Nat. (1842) 161.

Perennial, 5–15 cm high, the whole plant densely white-tomentose with stellate hairs; rhizome many-branched, multicipital; upper branches 7–10 cm, bearing many old dead leaves and ending in a rosette of live ones; leaves lanceolate, short-acuminate at apex, with prominent midrib beneath. Racemes short; silicles 15–20 mm in diameter, with thin, grayish downy, stellate hairs, cells 4-seeded. June.

Taluses of the alpine zone. – Caucasus: S. Transc. (Nakhichevan ASSR). Gen. distr.: Iran. Described from the town of Alwand, Iran. Type in Geneva.

364 Genus 642. **KONIGA** † ADANS.††

Adans., Fam.d.plantes II (1763) 420. – Lobularia Desv.in Journ.de Bot.III (1814) 162.

Sepals divergent, not saccate. Petals clawed, white. Filaments free, edentate. A short, filiform, nectariferous gland on both sides of shorter stamens, on the inner side of each of the longer stamens another filiform gland. Ovary sessile, style short, stigma obtuse, finely 2-lobed. Fruit a bivalvular silicle, compressed from back, with 1-seeded cells. Septum reticulate-nerved, with numerous parallel dividing walls of epidermal cells. Seeds marginate. Hairs bipartite. — Perennials or undershrubs, with entire leaves.

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* From the Greek physos – swollen and ptych – fold.

** Treatment by N.A. Bush.

† After Charles Konig, inspector in the British Museum.

†† Treatment by N.A. Bush.

Five species native to the Mediterranean area and the Macaronesian subregion.* Only one grows in the USSR.

Note. A genus close to Alyssum but the absence of median nectariferous glands distinguishes it from all Alyssinae.

1. **K. maritima** (Desv.) R. Br. in App. Denh. et Clapp. Narr. Exp. Afr. II (1826) 214; Shmal'g., Fl. I (1895) 90. — Lobularia maritima Desv., Journ. Bot. III (1814) 169; N. Busch in Fl. cauc. crit. III, 4 (1910) 617. — Ic.: Sibth. et Sm., Ic. Fl. Graec. tab. 621; Rchb., Ic. Fl. Germ. tab. XVIII, f. 4266. — Exs.: HFR No. 1708.

Perennial, silvery and appressed hairs, woody at base, many-stemmed; stems decumbent, 10—40 cm long; leaves linear-lanceolate, acute; sepals 1.75 mm long; petals 3.5—4 mm long; fruiting pedicels 7 mm long; silicles glabrous or sparsely covered with bipartite hairs, oval, 3—4 mm long, 2.5 mm broad; style 0.7—0.75 mm long. April—June.

Weed-infested places along seashores, sea-facing slopes. European part: Crim.; Caucasus: W. Transc. Introduced into Tbilisi. Gen. distr.: Med., Macaronesia.* Described from Europe. Types in Paris and London.

Genus 643. **CLYPEOLA** ** L.†

L., Sp.pl. (1754) 653; Gen.pl.ed.5 (1754) 293; Hayek, Crucif.-Syst. (1911) 249.

Sepals divergent, not saccate. Petals short-clawed, white or yellow. Stamens free, filaments dilated at base, dentate. A small median gland on both sides of shorter stamens. Ovary sessile, stigma sessile, capitate, slightly 2-lobed. Fruit 1-seeded, indehiscent, orbicular, compressed from 365 back, glabrous, pubescent or hispid, aseptate. Seeds flattened, wingless. Cotyledons flat, embryo pleurorhizal. Hairs branched, sometimes bristly. — Annuals with entire leaves and pendulous fruit.

A Mediteranean genus of 13 species, four of which are encountered in the USSR.

1. Silicle oval, subacute, covered with capitate bristles, visible with a magnifying glass. Leaves oblong-ovate, 5-veined . . . . 6. C. dichotoma Boiss.
+ Silicle orbicular, obtuse, glabrous or pilose, but hairs not capitate. Leaves linear, 1-nerved . . . . 2.
2. Silicle coriaceous, covered with rigid, barbed bristles, more or less dentate along margin . . . . 5. C. echinata DC.

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* [Part of the Holarctic.]

** From the Latin clypeus and clypeum — shield.

† Treatment by N.A. Bush.

+ Silicle membranous, glabrous or short-hairy, not dentate along margin, sometimes with beaded margin . . . . 3.

3. Silicle with beaded margin . . . . *4. C. elegans Boiss. et Huet.

+ Silicle margin not beaded, continuous (uninterrupted) . . . . 4.

4. Silicle margin flattened, of same color as cell, not thickened . . . . . 5.

+ Silicle margin glabrous, green, thickened . . . . . . *3. C. raddeana Alb.

5. Silicle suborbicular, hardly emarginate at apex, 3–5 mm in diameter . . . . 1. C. jonthlaspi L.

+ Silicle oboval-elliptic, more deeply emarginate, small (2.5–2.75 mm in diameter) . . . . 2. C. microcarpa Boiss.

Section 1. **JONTHLASPI** DC., Syst. II (1821) 326. – Silicle membranous, glabrous or covered with simple hairs.

1. **C. jonthlaspi** L., Sp. pl. (1753) 652; Ldb., Fl. Ross. I, 144, 754; Shmal'g., Fl. I, 101; N. Busch in Fl. cauc. crit. III, 4 (1910) 612. – C. bruhnsii Gruner in Bull. Soc. Nat. Mosc. XL (1867) 396. – Ic.: Rchb., Ic. Fl. Germ. fig. 4230 (var. lasiocarpa Grun.). – Exs.: HFR No. 1006 (var. lasiocarpa Grun.).

Annual; stem simple or branching, 4–27 cm high; leaves entire, oblong- or linear-spatulate. Racemes dense; sepals 1.5 mm long; petals ca. 2 mm long; fruiting pedicels 3–4 mm long; silicles suborbicular, slightly emarginate at apex, 3–5 mm in diameter, 1-seeded, rarely 2-seeded, winged with flattened entire margin, disk and margin of silicles with simple hairs 366 (var. glabriuscula Grun.), or silicles completely glabrous (var. leiocarpa Grun.), or disk glabrate and margin hairy; seeds half as broad as silicle; style absent or very short and visible (var. bruhnsii (Grun.) N. Busch), March–June. (Plate XXII, Figure 3).

Sandy semideserts, dry hills, slopes, and roadsides. – European part: Crim.; Caucasus: Dag., W. Transc. (Sukhumi), E., and S. Transc., Tal.; Centr. Asia: Ar.-Casp., T. Sh., Pam.-Al. **Gen. distr.** Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Europe. Type in London.

Note. A typical Mediterranean species.

2. **C. microcarpa** Boiss., Diagn. Ser. I, 1 (1842) 74; Fl. Or. I (1867) 308. – C. jonthlaspi f. microcarpa N. Busch in Fl. cauc. crit. III, 4 (1910) 613.

Annual, similar to the preceding but silicles obovate-elliptic, 1.8–2.5 mm in diameter, more deeply emarginate at apex; seeds nearly half as broad as cell; fruiting raceme shorter and denser. May.

Limestone rocks and maritime sands. – European part: Crim.; Caucasus: E. Transc. (Baku). **Gen. distr.**: Bal.-As. Min., E. Med., Iran. Described from Athens. Type in Geneva. (The plant is grown in Leningrad from seeds sent to K. A. Meier by Morison on 2 October 1851.)

*3. **C. raddeana** Alb. in Bull. Herb. Boiss. II (1894), No. 7, 448; N. Busch in Fl. cauc. crit. III, 4 (1910) 615.

Annual, slender plant with branching stem, 11–36 cm high; leaves oblong-spatulate, obtuse. Sepals 1.25–1.5 mm long; petals 2 mm long; fruiting pedicels spreading or recurved, very thin, 3–4.5 mm long; silicles suborbicular, emarginate, ca. 2.5 mm long, ca. 2 mm broad; disk tuberculate, margin green, glabrous, thickened, wingless; style 0.2–0.6 mm long, longer than apical incision. May.

Sandy slopes, dry rocks, stony slopes, and taluses. – Artvin District, Turkey. Described from Artvin. Types in Tbilisi and Geneva.

Note. Noted in case it might be found in Transcaucasia.

★4. **C. elegans** Boiss. et Huet in Boiss., Diagn. Ser. 2, V (1849) 38; N. Busch in Fl. cauc. crit. III, 4 (1910) 616.

Annual; stem ca. 30 cm high, branching from base; lower leaves spatulate-linear, the upper lance-linear, obtuse. Sepals oval, the outer pilose, golden-yellow, 1.75 mm long; petals also golden, ca. 3.5 mm long; fruiting pedicels 367 thin, 4–5 mm long; silicles orbicular or ovate-orbicular, hardly emarginate at base and apex, 3.25–3.5 mm long, 2.75–3 mm broad, disk with soft, white hairs, margin glabrous, beaded; style somewhat longer than the apical incision, 1.5–1.8 mm long. May.

Rocks. – Altin Province, Turkey, Arm.-Kurd. Described from Turkish Armenia. Type in Geneva.

Note. Noted in case it might be found in Transcaucasia.

Section 2. BERGERETIA DC., Syst. II (1821) 328; Boiss., Fl. Or. I (1867) 309. – Silicle coriaceous, covered with rough bristles and bearing retrorse hairs, dentate along margin, not winged.

5. **C. echinata** DC., Syst. II (1821) 328; Boiss. in Ann. Sc. Nat. (1842) 174. – Ic.: Jaub. et Spach, Illustr. Or. tab. 206.

Annual, small plant with alternate branches; leaves narrowly oblong-linear, entire. Racemes terminal; petals slightly longer than calyx; pedicels as long as silicle; silicles elliptic-globular, obtuse, ca. 3 mm in diameter, more or less distinctly denticulate along margin. Style very short.

Dry steppes. – Centr. Asia: Pam.-Al. **Gen. distr.**: E. Med., Iran, Ind.-Him. Described from the area between Baghdad and Kermanshah. Type in Geneva.

Section 3. PSEUDANASTATICA Boiss., Fl. Or. I (1867) 310. – Silicle (under magnifying glass) covered with minute bristles, entire along margin. Annual, with 5-veined leaves; the upper overlapping inflorescence.

6. **C. dichotoma** Boiss. in Ann. Sc. Nat. Sér. 2, XVII (1842) 175; Fl. Or. I (1867) 310; N. Busch in Fl. cauc. crit. III, 4 (1910) 616. – Pseudoanastatica dichotoma Grossh. in Fl. Kavk. II (1930) 212.

Annual, small, spreadingly branching brittle plant; stem 4–15 cm high; leaves ovate-oblong, 15–20 mm long, 8–10 mm broad, the lower tapering at base, the rest sessile. Racemes dense; sepals ca. 1 mm long; petals ca. 1.5 mm long; fruiting pedicels 2.5–3 mm long; silicles subacute at apex, scabrous with minute, capitate bristles visible only under strong magnifying glass, entire along margin, 2.75–3 mm long; style longer than bristles, 0.6–0.7 mm long. May–June. (Plate XXII, Figure 4).

Solonetzic places. – Caucasus: E. and S. Transc. **Gen. distr.**: Arm.-Kurd., Iran. Described from Nakhichevan and Shabanli (Armenia) and from N. Iran. Type in Geneva.

368 Genus 644. **BUCHINGERA*** BOISS. et HOHEN.**

Boiss. et Hohen. in Boiss., Diagn. II sér. (1849) 29.

Sepals divergent, not saccate. Petals spatulate, undivided, white. Filaments simple. A small nectariferous gland on both sides of shorter stamens, median glands absent. Ovary sessile, style persistent, stigma obtuse, shortly 2-lobed. Fruit a globular silicle compressed from the back, valves flat, netted-veined, densely covered with anchor-shaped hairs. Septum delicate, with numerous parallel dividing walls of epidermal cells. Cells 1-seeded, one seed generally undeveloped and then fruit 1-seeded. Seed flattened, with coriaceous wing. Cotyledons flat, embryo pleurorhizal. Hairs branched (anchor-shaped). – Annual, with axillary flowers and recurved pedicels.

A monotypic Iranian-Central Asian genus.

1. **B. axillaris** Boiss., Diagn. pl. or. nov. II Sér. (1849) 29; Fl. Or. I (1867) 305. – Exs.: H. F. A. M. No. 92.

Annual; stem simple or branching from base, decumbent, 7–70 cm long; leaves oblong, 3–7 cm long, 1–2.5–3 cm broad, tapering at base into a short petiole. Flowers solitary, axillary, small; petals slightly longer than calyx; fruiting pedicels 2–9 mm long, thin, recurved; silicles flattened, globular, in diameter: 5 × 6, 6 × 7, 7 × 8, 8 × 9 mm, covered with anchor-shaped hairs as is the entire plant but much longer. Fl. April–May, Fr. June–July.

Shrubs and broad-leaved forests on stony soil. 1,200–2,600 m. – Caucasus: S. Transc. (Erevan); Centr. Asia: Mtn. Turkm., Amu D., Syr D., T. Sh., Pam.-Al. **Gen. distr.**: Iran. Described from Iran, according to specimens from Teheran and Kokhrund (between Isfahan and Teheran). Type in Geneva.

Genus 645. **SCHIVEREKIA** † ANDRZ. ††

Andrz. in DC., Syst. II (1821) 300; Hayek, Crucif.-Syst. (1921) 251.

Sepals divergent, not saccate. Petals white, broad, clawed. Filaments of longer stamens dilated, toothed. A small, triangular, nectariferous gland on both sides of shorter stamens, median glands absent. Ovary sessile, 371 style elongated, persistent in fruit, stigma obtuse, shortly 2-lobed. Silicle compressed from back, ellipsoidal; valves flat, nerveless. Cells 4–8–10-seeded.

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* After Prof. Buchinger of Strasbourg, friend of Boissier.

** Treatment by N.A. Bush.

† After the Polish botanist, Schiverek.

†† Treatment by N.A. Bush.

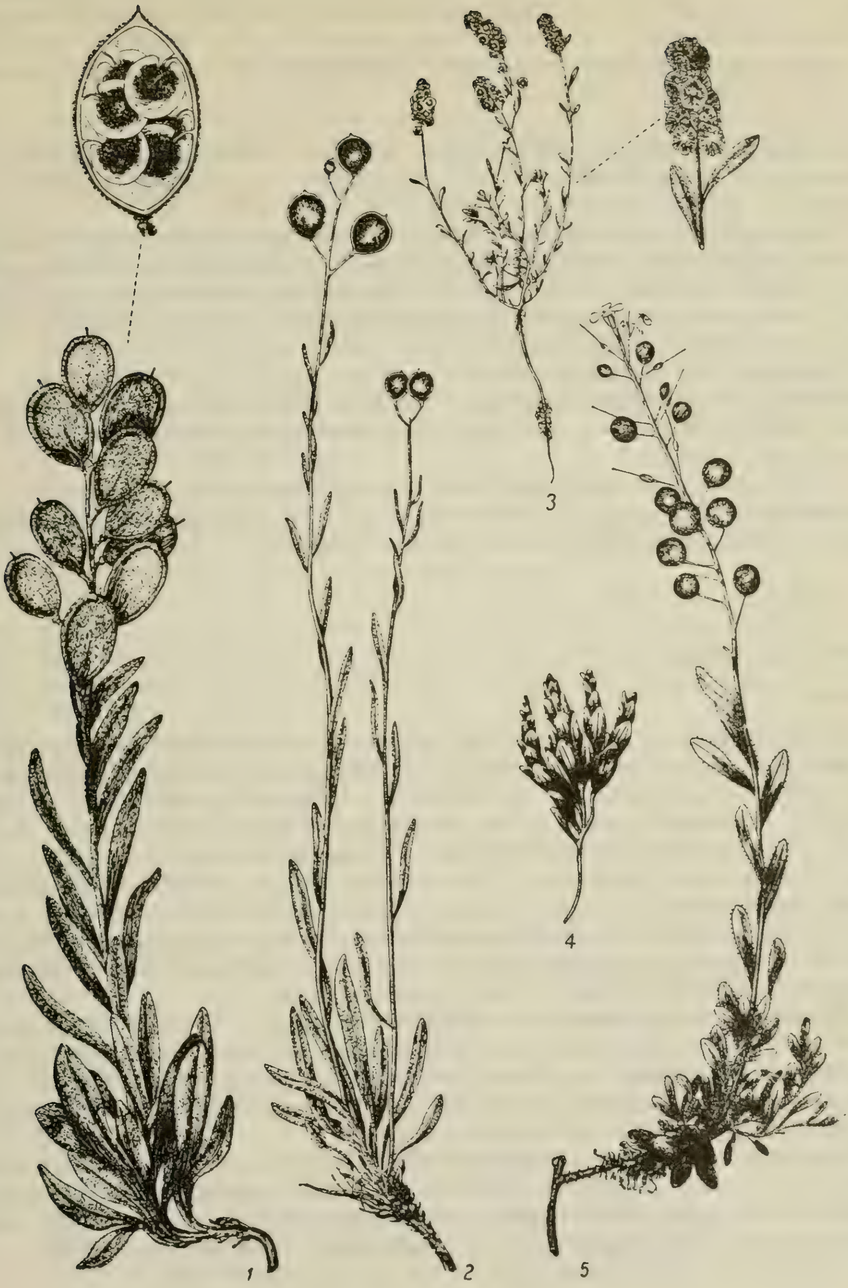

PLATE XXII. 1 – Fibigia macroptera Boiss.; 2 – F. suffruticosa Sweet.; 3 – Clypeola jonthlaspi L., and (enlarged) top of branch with fruits; 4 – C. dichotoma Boiss.; 5 – Vesicaria graeca Reut.

Seeds biseriate. Septum with midrib and irregularly polygonal epidermal cells. Seeds slightly flattened, wingless. Cotyledons flat, embryo pleurorhizal. Hairs stellate. — Perennials, densely gray-pubescent with stellate hairs, leaves entire.

A genus of 2 species, one grows in Albania, Macedonia, and Asia Minor, the other in Eastern Europe.

1. **S. podolica** Andrz. in DC., Syst. II (1821) 300; Shmal'g., Fl. I (1895) 90; Voron. in Fl. Yugo-Vostoka V (1931) 426; Kryl., Fl. Zap. Sib. VI (1931) 1333. — Ic.: Voron., l. c., 427, Fig. 381.

Perennial, densely branched; stem 8–20 cm high; lower leaves rosetted at base of flowering stems, oblong-obovate to oblong-oblanceolate, tapering into a petiole; cauline leaves slightly amplexicaul, oval. Sepals ca. 2.5 mm long; petals ca. 5 mm long; silicle gray-tomentose, 3–4 mm long, with a rather long style. April–June.

Rocks and dry slopes, particularly calcareous. — Arctic: Nov. Z. ?; European part: V.-Don, Dv.-Pech., V.-Kama, Transv., M. Dnp. Gen. distr.: Centr. Eur. (Galicia), Bal.-As. Min. Described from Podolia. Types in Geneva and Leningrad.

Note. An ancient preglacial xerophyte preserved in the USSR on ravines and cliffs along the southern margin of the Scandinavian-Russian glacier, in the Urals, and possibly, Novaya Zemlya.

Genus 646. **DRABA** * L.**

L., Gen. pl. (1737) 194.

Sepals slightly oblique, generally elliptic or ovate, obtuse at apex and thin at margins. Petals white or yellow, obovate, broad- or oblong-ovate, rarely spatulate, attenuate-elongate toward base, with straight, rounded or sinuate margin. Filaments edentate, thin, sometimes dilated in lower part. Anthers ovate. Stigma obtuse, broadly 2-lobed. Style cylindrical or filiform, sometimes almost undeveloped. Silicle oval, elliptic, ovate, or lanceolate, rarely subglobular or linear, straight or slightly curved, flattened or somewhat convex, sometimes constricted, bilocular. Valves obscurely netted-veined. Cells many-seeded. Septum fiberless, epidermal cells irregularly polygonal. Cotyledons flat. Embryo pleurorhizal.

372 Perennial, rarely biennial or annual herbs, usually forming compact or loose tufts, small, often very low. Stems leafy or (often) with rosettes of leaves at base of branches, scapoid at summit, leafless or bearing few leaves. Flowers small or medium in size, arranged in a more or less compact, sometimes many-flowered raceme.

Economic importance. Some species (D. hirta, D. incana, for example) are readily eaten by domestic cattle in the North; however, they are of little economic importance because they are so small and grow randomly. Some of the species with large flowers are cultivated as ornamental plants.

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* After the Greek drabe — Dioscorides' name for Lepidium draba L.

** Treatment by A.I. Tolmachev.

Key to the Series of the Genus Draba*

1. Stems more or less evenly leafy or most basal leaves congested in radical rosettes, flowering stems with one or few leaves . . . . . . 32.

+ All leaves congested in radical rosettes; flowering stems leafless . . . . 2.

+ Plants with creeping leafy shoots, some leaves sometimes forming rosettes; flowering stems leafless or with 1–3 leaves, growing from side of shoots . . . . Series 26. Repentes Tolm.

2. Annuals, with rosettes of leaves withering early, usually already marcescent at maturation of fruit . . . . . Series 28. Nemorosae Tolm.

+ Biennials or perennials; rosettes of leaves not withering early, live up to maturation of fruit . . . . 3.

3. Biennials or short-lived perennials, with weak, thin rootstock; few joined flowering stems ascending from middle of radical rosette . . . . Series 29. Lineares Pohle.

+ Perennials, compactly or loosely cespitose, with robust rather thick rootstock; flowering stems ascending from middle of radical rosettes, always solitary . . . . 4.

4. Leaves obovate, elongating at base into a rather broad petiole; all leaves or part of them with large, wide teeth along margin; flowers yellow, large; fruiting raceme strongly elongated spreading; pedicels as long as or longer than silicles . . . . Series 24. **Hispidae** Tolm.

+ Plants not as above; leaves entire or narrowly denticulate . . . . . . 5.

373 5. Leaves flat, soft, with rounded or subobtuse (rarely subacuminate) tip, densely pubescent with minute stellate and branched hairs, often canescent . . . . 21.

+ Leaves keeled, sometimes rigid, with stiff cilia along margin, pubescent with simple, branched, or stellate hairs, or glabrous at surfaces, generally narrow . . . . 6.

6. Leaves more or less pubescent at one or both surfaces . . . . 12.

+ Leaves ciliate at margins or completely glabrous . . . . 7.

7. Leaves flat, broad . . . . 8.

+ Leaves narrow, often keeled . . . . 9.

8. Flowers few (2–6 in raceme), long-pedicelled (up to 18 mm), white; silicles elliptic, rounded at apex, slightly tapering toward base . . . . Series 9. Supranivales Tolm.

+ Flowers usually more than above (3–15 in raceme), short-pedicelled, yellowish white; silicles oblong-ovate or ovate-lanceolate, acuminate . . . . Series 7. Alpinae Tolm.

9. Leaves slightly keeled to flat; marcescent rosettes not preserved; flowers white . . . . Series 8. Lacteae Tolm.

+ Leaves rigid, keeled; dead rosettes forming a compact cover on stem branches . . . . 10.

10. Flowers large (petals 6–9 mm long); silicles with long (up to 7 mm) filiform elongated style . . . . Series 1. Cuspidatae Tolm.

+ Flowers smaller (petals 3.5–6 mm long); silicles with relatively short style (up to 1 mm) . . . . 11.

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* The genus Draba is usually subdivided into rather artificial sections; because of this we have divided it into such series as comprise closely related species.

11. Flowering stems glabrous . . . . Series 2. Bryoideae Tolm.
+ Flowering stems pubescent . . . . Series 3. Pilosae Tolm.
12. Leaves with only or mostly simple (often simple and generally rigid, long hairs . . . . 19.
+ Leaves (besides marginal cilia) almost or wholly covered with small branched hairs, or with small branched and simple hairs equally profuse . . . . 13.
13. Leaves narrow, rigid, keeled; withered rosettes compactly cover branches . . . . 14.
+ Leaves narrow or relatively broad, flat or slightly keeled, deciduous (after dying) or only midribs persistent . . . . 16.
14. Leaves long-ciliate along margins, with cilia usually simple, rarely partly branched . . . . 15.
374 + Leaf-margin with small branched hairs scattered among long, simple cilia; silicles densely pubescent . . . Series 2. Bryoideae Tolm.
15. Silicles inflated, densely pubescent, small (up to 5 mm long); flowering stems glabrous (Transcaucasian plants) . . . . Series 2. Bryoideae Tolm.
+ Silicles not inflated, glabrous or pubescent, small or rather large; flowering stems pubescent or if glabrous then longer than 6 mm (Arctic plants) . . . . Series 3. Pilosae Tolm.
16. Leaves narrow, lance-linear, sometimes slightly keeled; flowers white, usually small . . . . Series 8. Lacteae Tolm.
+ Leaves oblong, usually somewhat dilated near tip, not keeled; flowers yellow or yellowish white, relatively large . . . . 17.
17. Leaves obtuse, more or less densely pubescent below, glabrous or glabrescent above, often glaucescent, rosettes very compact, often slightly separated from each other . . . . . . Series 5. Pamiricae Tolm.
+ Leaves obtuse or subacuminate, almost equally pubescent on both sides, or if glabrescent at apex, then shiny, not glaucescent . . . . . . 18.
18. Silicles inflated, pubescent with small branched hairs and with a long (1–2 mm) style . . . . Series 10. Physocarpae Tolm.
+ Silicles not inflated, with short (not longer than 1 mm) style . . . . Series 7. Alpinae Tolm.
19. Flowers white . . . . Series 17. Rupestres Tolm.
+ Flowers yellow . . . . 20.
20. Rosettes of dead leaves cover stem branches for a rather long time . . . . Series 4. Polytrichae Tolm.
+ Leaves fall when dead, or if persist, then only a few, incomplete rosettes . . . . Series 7. Alpinae Tolm.
21. Stem with long stiff branches; leaves rounded-obovate, tapering into a petiole . . . . Series 13. Imereticae Tolm.
+ Branches more or less short, not stiffened . . . . 22.
22. Leaves green, somewhat shiny from the small stellate hairs, not canescent; flowers small, petals narrow, spatulate, 2.5–3 mm long; silicles with an obsolete style . . . . . Series 6. Oblongatae Tolm.
+ Leaves gray-pubescent; if not densely pubescent and leaves green, then flowers larger and silicles with a well-developed style . . . . . 23.
375 23. Leaves subacuminate, usually denticulate along margin, moderately pubescent, not canescent; flowers white, petals 4–5.5 mm long; silicles oblong-ovate or ovate-lanceolate, sometimes contorted . . . . Series 18. Hirtae Tolm.

+ Plant other than above . . . . 24.

24. Flowering stems completely pubescent . . . . 25.

+ Flowering stems glabrous or more or less pubescent only in lower part . . . . 30.

25. Flowers white, small (petals 2–3.5 mm long); silicles small, with short style (up to 0.5 mm) . . . . 26.

+ Flowers larger (petals not shorter than 4 mm); nearly always yellow; silicles sometimes large, often with elongated style . . . . . . 27.

26. Silicles glabrous . . . . Series 15. Nivales Tolm.

+ Silicles pubescent . . . . Series 16. Cinereae Tolm.

27. Flowers white, petals 4–6 mm long; silicles 6–8 mm long; style ca. 1 mm (Far Eastern plants) . . . . Series 21. Cardaminiflorae Tolm.

+ Flowers yellow or pale yellow (Central Asian plants) . . . . 28.

28. Leaves oblong; flowers pale yellow; silicles oblong or lanceolate, with relatively short style (0.4–1 mm), pubescent . . . . Series 12. Tibeticae Tolm.

+ Leaves oblong or obovate; flowers yellow; silicles ovate or elliptic, usually with long style (1–7 mm); if style short (0.75–1 mm) then silicles glabrous . . . . 29.

29. Leaves oblong; flowers relatively small (petals 4–5.5 mm long); silicles not large (3–7 mm long without style) . . . . Series 10. Physocarpae Tolm.

+ Leaves oblong- or broad-obovate; flowers large (petals 5–9 mm long); silicles large (6–18 mm long without style), with long style (1.25–7 mm) . . . . Series 11. Darwasicae Tolm.

30. Plant forming compact, pulvinate, often large tufts; petals 4–7 mm long (Caucasian plants) . . . . Series 14. Mollissimae Tolm.

+ Plants forming more or less loose tufts or if compact then small and petals 3–3.5 mm long (Central Asian and Siberian plants) . . . . 31.

31. Flowers pale yellow; silicles relatively large, pubescent . . . . Series 12. Tibeticae Tolm.

+ Flowers white, small; silicles small, glabrous . . . . Series 15. Nivales Tolm.

32. Annuals or biennials; stems solitary or growing in groups but not cespitose; leaves of radical rosettes dying soon . . . . 33.

376 + Perennials, rarely biennials, forming tufts or shrubs, with thick rhizome; leaves of radical rosettes not dying early . . . . 35.

33. Rhizome thin, weak; plant more or less densely pubescent but not canescent; flowers yellow or yellowish white; fruiting raceme spreading or more or less elongated, not whiplike . . . . . . 34.

+ Rhizome more robust; plant densely gray-pubescent; flowers white, fruiting raceme whiplike . . . . Series 20. Incanae Tolm.

34. Pedicels rather stout, densely pubescent: flowering raceme compact; silicles ovate or elliptic, as long as or longer than pedicels . . . . Series 27. Eriopodae Tolm.

+ Pedicels thin, glabrous or very slightly pubescent; flowering raceme loose; silicles narrowly oblong-elliptic or linear, almost as long as or much shorter than pedicels . . . . Series 28. Nemorosae Tolm.

35. Rosette leaves large, 2.5–10 cm long, 0.5–2.5 cm broad, large-toothed; flowering stems hardly or not more than half exceeding the leaves . . . . Series 23. Hyperboreae Gilg.

+ Rosette leaves much smaller, usually not longer than 2–2.5 cm, sometimes individual leaves much longer but then, flowering stems several times longer than the longest leaves . . . . 36.

36. Leaves glabrous, ciliate only along margin, sometimes reduced . . . 37.

+ Leaves pubescent . . . . 39.

37. Silicles long, linear; flowers white . . . . Series 25. Subsecundae Tolm.

+ Silicles linear-elliptic or oblong-ovate . . . . 38.

38. Flowers yellowish white, rather large (petals ca. 5 mm long); silicles oblong-ovate, style ca. 0.5 mm . . . . Series 7. Alpinae Tolm.

+ Flowers white, small (petals ca. 3 mm long); silicles oblong-elliptic, with very short style . . . . Series 8. Lacteae Tolm.

39. Indumentum wholly or predominantly of stiff, simple hairs (sometimes also furcate and branching) . . . . 40.

+ Indumentum (throughout plant or only of leaves) wholly or predominantly of small, stellate and branched hairs . . . . 41.

40. Leaves broad, the radical obovate or oblong-obovate; leaves on flowering stems relatively large, sometimes not smaller than rosette leaves; flowers large (petals 4–8 mm long); silicles often contorted . . . . Series 22. Boreales Pohle. 377

+ Leaves much narrower; leaves of flowering stems always smaller than rosette leaves, often very small; flowers small (petals 2–4 mm long); silicles not contorted . . . . Series 17. Rupestres Tolm.

41. Flowering stems pubescent with long, simple hairs; thus different from leaves . . . . Series 22. Boreales Pohle.

+ Silicles similar in pubescence to that of leaves or nearly so, or glabrous . . . . 42.

42. Stout plant, with low flowering stems (up to 6 cm); flowers yellow, large (petals 6 mm long); silicles broad, with long style (ca. 2 mm) . . . . Series 11. Darwasicae Tolm.

+ Flowers white, if (rarely) pale yellow, then petals not longer than 5 mm; style short, if long (1–2 mm), then flowering stems tall (10 cm) . . . . 43.

43. Flowers pale yellow . . . . 44.

+ Flowers white . . . . 45.

44. Leaves densely gray-pubescent; pedicels long (Central Asian plants) . . . . Series 12. Tibeticae Tolm.

+ Leaves densely pubescent but not canescent; pedicels short (Arctic plants) . . . . Series 7. Alpinae Tolm.

45. Leaves and sometimes flowering stems canescent with small, stellate and branched hairs . . . . 46.

+ Leaves densely or moderately pubescent, not canescent . . . . 52.

46. Flowering stems more or less thick, gray-pubescent, erect, sometimes branching; leaves on stems subacuminate, all or part distinctly denticulate, sometimes many; petals narrow; pedicels markedly shorter than silicles . . . . 47.

+ Flowering stems more or less thin, shiny or slightly canescent, rarely thick but then not gray; flowers small or large; petals obovate; pedicels relatively long, nearly as long as silicles . . . . . 48.

47. Silicles ovate, often contorted . . . . Series 19. Lasiophyllae Tolm.

+ Silicles elliptic-lanceolate, not contorted . . . . Series 20. Incanae Tolm.

48. Flowering stems and pedicels glabrous or somewhat pubescent . . . 49.

+ Flowering stems and pedicels more or less densely pubescent . . . . 50.

378 49. Very small plants; petals 3–3.5 mm long; silicles with very short style . . . . Series 15. Nivales Tolm.

+ Much larger plants; petals 4–6 mm long; silicles with rather long style (ca. 1 mm) . . . . Series 21. Cardaminiflorae Tolm.

50. Large loosely cespitose plants; petals 6.5–7 mm long; silicles with long style (1.5–2 mm) . . . . Series 21. Cardaminiflorae Tolm.

+ Much smaller, often compactly cespitose plants; petals not longer than 1 mm; style often very short . . . . 51.

51. Silicles narrow, lanceolate, glabrous; style ca. 0.3 mm long . . . . Series 15. Nivales Tolm.

+ Silicles oblong-oval or ovate, nearly always pubescent; if glabrous then style 0.5–1 mm long . . . . Series 16. Cinereae Tolm.

52. Flowering stems with 1 or 2, small, usually entire leaves . . . . Series 8. Lacteae Tolm.

+ Flowering stems with 1–8 rather large leaves, similar to the rosette leaves or broader, often distinctly dentate, sometimes nearly embracing scape at its base . . . . Series 18. Hirtae Tolm.

Series 1. **Cuspidatae** Tolm. – Perennials, compactly cespitose. Branches covered with compact old, dead rosettes. Leaves narrowly linear, rigid, keeled, entire. Indumentum exclusively of stiff, marginal cilia. Flowering stems scapoid. Flowers yellow. Silicles large, with a very long, filiform, elongated style.

1. **D. cuspidata** M. B., Fl. taur.-cauc. III (1819) 424; Ldb., Fl. Ross. I (1842) 144; N. Busch in Fl. cauc. crit. III, 4 (1909) 448; Schulz, Draba et Erophila in Engler's, Pflzr. (1927) 41. – D. aizoides Pall., Tabl. taur. (1795) 54 (non L.). – D. aizoides var. cuspidata Neilr. ap. Stur in Oest. bot. Ztschr. XI (1861) 143.

Perennial, compactly cespitose plants; leaves narrowly linear, 6–15 mm long, subobtuse or subacuminate, ciliate at tip, rigid, entire, with strongly prominent midrib below, with stiff, long cilia along margin, lower leaves sometimes slightly recurved, the upper turned toward apex; old rosettes persist for a number of years densely covering stem branches; flowering stems leafless, 2–7 cm tall at flowering, thick, erect or slightly curved, with rather long simple or furcate hairs. Raceme 4–14-flowered, subcapitate, subanthesis, strongly elongating post anthesis; pedicels densely 379 pubescent with soft, simple and furcate hairs, at first short (approximately as long as sepals), later elongating; sepals oblong-ovate, green or lilac, more or less covered with fine, simple and branched hairs, 3–5 mm long, petals yellow, oblong-obovate, rounded or slightly emarginate, 6–9 mm long;

stamens long, slightly shorter than petals; silicles oblong-ovate or elongately elliptic-ovate, 6–10 mm long, as long as or slightly shorter than pedicels (rarely slightly longer), subacuminate; style filiform, slightly curved, long (up to 7 mm), densely covered with stiff hairs; seeds rufous. April–May. (Plate XXIII, Figures 1 and 2).

Stony places. – European part: Crim. (Yaila). Gen. distr.: Bal.-As. Min. (Cilician Taurus). Described from the Crimea. Type in Leningrad.

Series 2. **Bryoideae** Tolm. – Perennials, more or less compactly cespitose. Stem branches covered with old, dead rosettes. Leaves narrow, linear or linear-lanceolate, rigid, keeled, entire, always ciliate along margin, glabrous on both sides or covered with small hairs. Flowering stems scapoid. Flowers yellow (rarely white). Silicles small, more or less short, style rather short (0.2–1 mm).

1. Leaves linear-lanceolate, strongly acuminate (narrow-cuneate), somewhat ciliate along margin . . . . 2. **D. scabra** C. A. M.
+ Leaves linear or linear-lanceolate, subobtuse, rather ciliate along margin . . . . 2.
2. Leaves very small (1.5–2.5 mm long), live rosettes and the dead ones covering stem branches rather compact . . . . 3. **D. bryoides** DC.
+ Leaves longer, linear, subobtuse; rosettes not as compact, dead rosettes covering stem branches relatively loosely . . . . 3.
3. Leaves with simple cilia only along margin . . . . 4. **D. heterocoma** Fenzl.
+ Leaves with simple cilia and smaller branched hairs along margin . . . . 4.
4. Tufts relatively loose; leaves very narrow, 4–9 mm long; flowers yellow . . . . 5.
+ Tufts compact, small; leaves 3.5–5 mm long; flowers white . . . . 5. **D. globifera** Ldb.
5. Fruiting raceme more or less spreading, not elongating; silicles covered only with simple hairs . . . . 6. **D. bruniifolia** Stev.
380 + Fruiting raceme usually distinctly elongating; silicle pubescent with furcate and branched hairs together with simple ones . . . . 7. **D. diversifolia** Boiss. et Huet.

2. **D. scabra** C. A. M., Verz. Pfl. Cauc. (1831) 182; Ldb., Fl. Ross. I (1842) 144; Boiss., Fl. Or. I (1867) 296; N. Busch in Fl. cauc. crit. III, 4 (1909) 442; Schulz, Draba (1927) 69. – Ic.: Somm. et Lev. in A. H. P. XVI (1900) tab. X, f. 1–5.

Perennial, compactly cespitose; leaves narrow, linear-lanceolate, tapering toward tip, mucronate, rigid, with slightly prominent midrib at lower side, glabrous, with small, dispersed cilia along margin (hardly visible to the naked eye); flowering stems leafless, erect or slightly curved, glabrous, 4–8 cm high. Raceme 5–10-flowered, more or less compressed at flowering, distinctly elongating in fruit; pedicels thin, glabrous; sepals ovate, pale, glabrous, 2.5 mm long; petals yellow, obovate, elongate at base, rather deeply emarginate, 4–6 mm long; silicles appressed to axis, the lower on elongated pedicels, ovate, usually slightly asymmetrical, 4–6 mm long, glabrous, somewhat elongated at apex; style 0.5–1 mm long; seeds brown. June–July.

Rocks and taluses, alpine mountain zone (up to 3,700 m). – Caucasus: Cisc. Endemic. Described from the Northern Caucasus. Type in Leningrad.

3. **D. bryoides** DC., Syst. II (1821) 335; Ldb., Fl. Ross. I (1842) 145; N. Busch in Fl. cauc. crit. III, 4 (1909) 435; Schulz, Draba (1927) 68. – D. rigida M. B., Fl. taur.-cauc. II (1808) 93, non Willd. – D. rigida β bryoides Boiss., Fl. Or. I (1867) 297. – Ic.: Schulz, l. c. (1927) 68.

Perennial, forming minute, quite compact, hemispherical tufts; leaves small, 1.5–2.5 mm long, oblong, subobtuse, rigid, with prominent midrib at lower side, ciliate along margin; dead leaves compactly cover stem branches, thus each branch becoming columnlike; flowering stems thin, erect or slightly curved, glabrous, 1–5 cm high. Raceme 2–6-flowered, rather loose; pedicels thin, glabrous; sepals ovate or elliptic, pale, slightly covered with simple hairs, rarely glabrous; petals obovate, slightly emarginate, yellow, 3.5–5 mm long; silicles oblong-ovate, slightly asymmetrical, about as long as pedicels, 4–6 mm long, glabrous; style thin, 0.6–1 mm long; seeds tiny, dark brown. June–July.

Rocks, moraines, and alpine meadows, from 2,000 to 3,400 m. – Caucasus: Cisc. Endemic. Described from the Northern Caucasus. Type in Geneva.

Note. Two varieties, var. squarrosa Rupr. (D. caespitosa Puschk. et Adams) and var. imbricata (C. A. M.) N. Busch (D. imbricata 381 (C. A. M.)), have been described. The first variety is distinguished by its looser tufts and elongated stem branches, the second by its unusually compact tufts and its shortness in all parts; both apparently represent ecological types.

4. **D. heterocoma** Fenzl, Pugill. pl. nov. Syr. (1842) 13; N. Busch, Fl. cauc. crit. III, 4 (1909) 448; Schulz, Draba (1927) 62. – D. olympica var. heterocoma Boiss., Fl. Or. I (1867) 295. – D. bruniaefolia var. γ heterocoma Bald. in N. Giorn. bot. ital. Nuov. ser. I (1894) 118. – Ic.: Fenzl, Ill. pl. Taur. (1843) t. XVIa.

Perennial, densely cespitose; leaves linear, subobtuse, with prominent midrib at lower side, covered with simple, furcate, and branched hairs, with long, simple cilia along margin; flowering stems 3–5 cm high, glabrous. Raceme loose, 6–17-flowered; sepals oblong-ovate, more or less covered with long, simple hairs; petals obovate, hardly notched, yellow, 5–6 mm long; silicles ovate, inflated, 3.5–5 mm long, 3 mm broad, densely pubescent; style 0.5 mm long; seeds dark brown. May.

Caucasus: W. Transc. (Adzharistan). **Gen. distr.**: Bal.-As. Min. Described from Near Asia.

5. **D. globifera** Ldb., Fl. Ross. I (1842) 145. – D. olympica β bruniifolia f. globifera Boiss., Fl. Or. I (1867) 295. – D. bruniifolia var. globifera Rupr., Fl. Cauc. (1869) 107; N. Busch in Fl. cauc. crit. III,4 (1909) 445; Schulz, Draba (1927) 64.

Perennial, small, compactly cespitose plants; leaves linear, subobtuse, 3.5–5 mm long, with thick midrib prominent at lower side, with simple, thin cilia at margin, sometimes mixed with fine, branched hairs, sometimes partly covering lower surface of leaves; flowering stems erect, thin, 1.5—5.5 cm high, more or less covered with small, delicate hairs. Raceme subcapitate, 4—11-flowered, sometimes slightly elongating in fruit; pedicels thin, densely pubescent; sepals ovate, somewhat covered with small, simple and branched hairs, pale; petals oblong-obovate, white, ca. 4 mm long; silicles short-ovate or suborbicular, shorter than pedicels, 2.5—4 mm long, densely covered with small, simple hairs; style thin, 0.2—0.4 mm long. July—August.

Stony places in the alpine zone. — Caucasus: S. Transc. Gen. distr.: Arm.-Kurd. Described from Ararat. Type in Leningrad.

6. **D. bruniifolia** Stev. in Mém. Soc. Nat. Mosc. III (1812) 268; Ldb., Fl. Ross. I (1842) 145; N. Busch in Fl. cauc. crit. III, 4 (1909) 444; Schulz, Draba (1927) 63. — D. olympica β bruniifolia Boiss., Fl. Or. I (1867) 295.

382 Perennial, relatively loosely cespitose plants; leaves linear, very narrow, subobtuse, 4—8 mm long, with a thick midrib prominent at lower side, simple, thin cilia along margin mixed with shorter furcate hairs, indumentum on lower surface pubescent with small, delicate, branched hairs; flowering stems erect, slightly curved, slender, 3—10 cm high, rather densely covered with short, delicate, branched hairs. Raceme loose, 6—12-flowered, spreading in fruit but not elongating; pedicels thin, pubescent; sepals ovate, slightly covered with simple, rarely furcate hairs, pale; petals oblong-obovate, weakly emarginate, yellow, 4.5—5.5 mm long; silicles ovate, shorter than pedicels, 3.5—4 mm long, densely covered with small, simple hairs; style ca. 0.5 mm long; seeds small, rufous. June—July. (Plate XXIII, Figure 3).

Rocks and stony places in the alpine zone. — Caucasus: Cisc., Dag., E. and S. Transc. Endemic. Described from the Shakh-Dag Range. Type in Leningrad.

Note. A series of varieties has been described, of which var. microcarpa Rupr., var. elliptica Alex., var. psilocarpa Rupr., and var. ericifolia (Stev.) Rupr. are recorded for the flora of the USSR.

7. **D. diversifolia** Boiss. et Huet in Boiss., Diagn. pl. nov., 2 sér., V (1856) 30. — D. olympica δ diversifolia Boiss., Fl. Or. I (1867) 295. — D. bruniifolia var. diversifolia Boiss., Fl. Or. Suppl. (1888) 54; N. Busch in Fl. cauc. crit. III, 4 (1909) 446; Schulz, Draba (1927) 65.

Perennial, small, rather compact cespitose plants; leaves linear, very narrow, subobtuse, with a thick midrib prominent at lower side, 4—9 mm long, simple cilia mixed with fewer, short, branched hairs along margin, lower side slightly covered with simple and branched hairs; flowering stems leafless, erect or slightly curved, 3.5—14 cm high in fruit, pubescent with thin, simple and branched hairs, sometimes glabrescent. Raceme 4—16-flowered, distinctly elongating in fruit; sepals narrowly ovate, covered with rather long, simple and furcate hairs; petals oblong-obovate, 4.5—5 mm long, pale yellow (when dry); silicles oblong-ovate or suboval, 3.5—5.5 mm long, distinctly shorter than pedicels, pubescent with small, simple hairs and partly with furcate and branched ones; style ca. 0.5 mm long; seeds rather large (up to 1 mm), bright rufous. July.

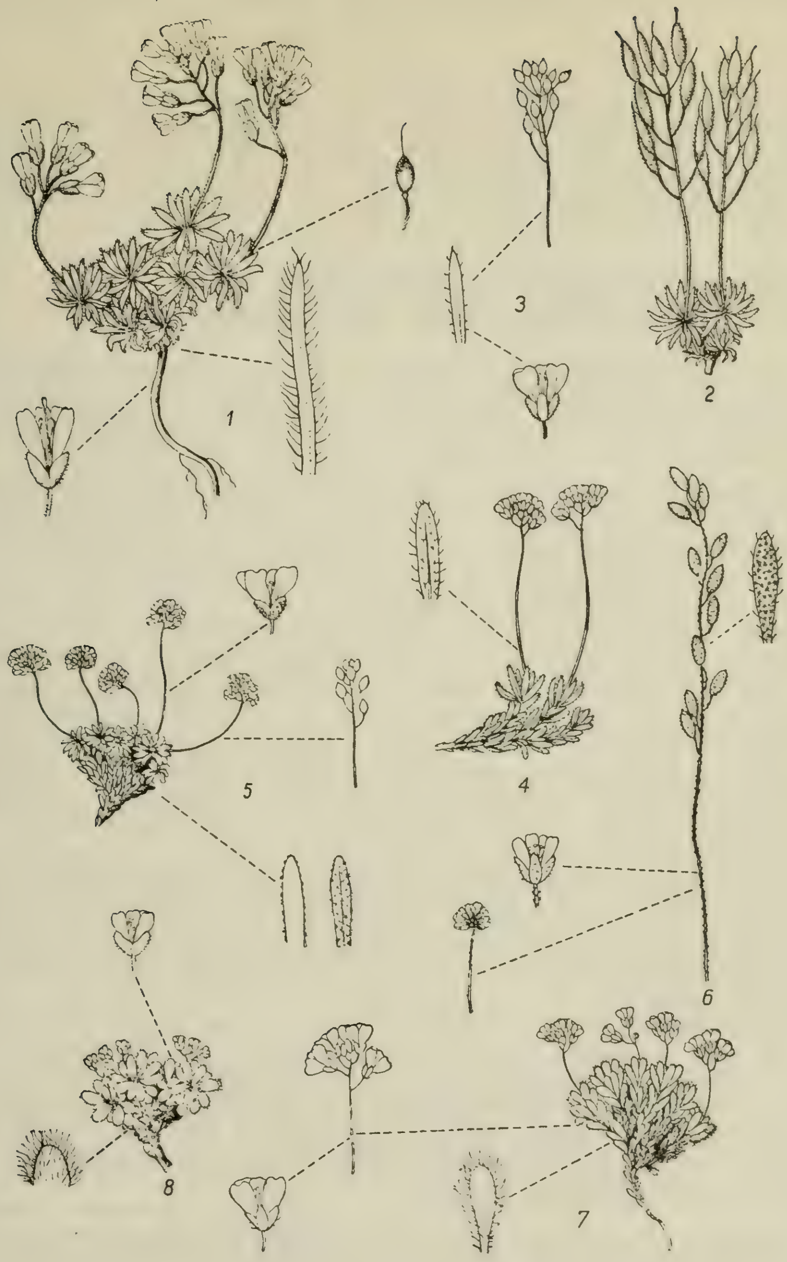

PLATE XXIII. 1 – Draba cuspidata M.B. with flowers; 2 – D.cuspidata M.B. with fruits; 3 – D.bruniifolia Stev.; 4 – D.pilosa DC.; 5 – D.korshinskyi (O.Fedtsch.) Tolm.; 6 – D.oblongata R.Br.; 7 – D.polystricha Ldb.; 8 – D.behringi Tolm.

385 Rocks. — Caucasus: W. and S. Transc. **Gen. distr.**: Arm.-Kurd. Described from the southwestern part of the Armenian Highland. Type in Geneva.

Series 3. **Pilosae** Tolm. — Perennials, forming compact tufts. Stem branches covered with old, dead rosettes. Leaves narrow, keeled, entire, ciliate along margin, covered above and especially below mainly with small, branched hairs. Flowering stems scapoid. Flowers yellow or yellowish white. Silicles more or less short. Style relatively short (0.2–1.25 mm).

1. Plants very small; petals 2–2.5 mm long, narrow . . . . 3.
+ Plants larger; petals 3.5–5 mm long, broad . . . . 2.
2. Stems glabrous or slightly hairy; leaves sparsely pubescent . . . . 8. **D. pilosa** DC.
+ Stems and leaves densely hairy . . . . 9. **D. barbata** Pohle.
3. Flowers bright yellow . . . . 10. **D. stenopetala** Trautv.
+ Flowers yellowish white . . . . 11. **D. subcapitata** Simmons.

8. **D. pilosa** DC., Syst. II (1821) 336; Adams in N. Mém. Soc. Nat. Mosc. III (IX) (1834) 248; Ldb., Fl. Ross. I (1842) 146; N. Busch, Fl. Sib. et Or. Extr. III (1919) 302; Pohle, Drabae asiat. (1925) 150. — D. alpina var. pilosa Schulz, Draba (1927) 91 p. pte. — D. aspera DC., Syst. II (1821) 337. — Ic.: N. Busch, l. c. (1919) 303 et tab. geogr. 304.

Perennial, compactly cespitose plants; leaves rigid, lanceolate or linear-lanceolate, sometimes slightly dilated toward apex, subacuminate, with a thick midrib prominent at lower side, more or less densely ciliate along margin (cilia simple, seldom branching), glabrescent above, densely covered with rather coarse, branched hairs below, 6–10 mm long; old, dead rosettes persist for 7–8 years and compactly cover stem branches; flowering stems 1.5–10 cm high, erect or slightly twisted, glabrous or slightly covered with small, furcate and simple hairs. Raceme 3–8-flowered, subcapitate at flowering, noticeably elongating in fruit; pedicels glabrous; sepals ovate, slightly hairy; petals broadly obovate, somewhat emarginate (rarely rounded), bright yellow, 4–5 mm long; silicles oval, 6–8 (in exceptional cases up to 10) mm long; about as long as pedicels, glabrous or slightly pubescent at margins with small, simple hairs; style 0.5–0.8 mm long. June–August. (Plate XXIII, Figure 4).

Dry, open tundra. — Arctic: Arc. Sib., Chuk., An. **Gen. distr.**: Arc. N. Am. Described from the lower reaches of the Lena River. Type in Geneva.

386 Note. Besides the type, var. aspera (Adams) Tolm. (D. aspera Adams, l. c. (1834) 242) is also encountered in the lower reaches of the Lena. — Leaves linear-lanceolate, subacuminate, with stiff, simple cilia along margin, glabrous on both sides; stems rather densely pubescent. Style 1 mm long. Otherwise, similar to type.

9. **D. barbata** Pohle in Bull. Jard. Bot. Pétersb. XIV (1914) 467; Drabae asiaticae (1925) 152; N. Busch, Fl. Sib. et Or. Extr. III (1919) 304; Schulz, Draba (1927) 101.

Perennial, compactly cespitose; leaves oblong, 7–12 mm long, ca. 1.5 mm broad, with a thick midrib prominent at lower side, subacuminate, ciliate along margin, densely covered bilaterally with simple, furcate, and branched hairs; rosettes of dead leaves persist for many years, compactly covering stem branches; stems 1.5–7 cm high, rather thin, densely pubescent with delicate, simple, furcate, and branched hairs. Raceme 4–12-flowered, subcapitate at flowering, somewhat elongating in fruit; pedicels densely pubescent; sepals oblong-ovate, dark, sometimes lilac, with soft, simple hairs; petals bright yellow, broadly obovate, slightly emarginate, 3.5–4 mm long; silicles oval, ca. 5.5 mm long and 2.5 mm broad; style 0.5–1.24 mm long. July

Dry tundra. – Arctic: Arc. Sib., Chuk. Gen. distr.: N. Am. Described from the Chukchi National District. Type in Leningrad.

10. **D. stenopetala** Trautv. in A. H. P. VI, 1 (1879) 11; N. Busch in Fl. Sib. et Or. Extr. III (1919) 303; Pohle, Dr. asiat. (1925) 153; Schulz, Draba (1927) 96. – Ic.: N. Busch, l. c. (1919) 305 et tab. geogr. 304.

Perennial, small, quite compact, cespitose plants; leaves oblong-spatulate, entire, obtuse, 2.5–5 mm long, with a thick midrib, simple cilia along margin, covered with small, branched and long, simple hairs on both sides, but mainly toward apex; old rosettes compactly covering stem branches; stems scapoid, 1–1.5 cm high, together with pedicels densely pubescent with small, branched and simple hairs. Raceme 2–4-flowered, rather dense; sepals oblong-ovate, covered with simple and branched hairs; petals narrow, slightly dilated in upper part, slightly notched to entire at margin, 2–2.5 mm long, yellow; silicles subglobular, ca. 2 mm long, with a rather long (0.5–0.75 mm) style. July.

Arctic: Chuk., An. Endemic. Description based on Maidel collection from the Anadyr River. Type in Leningrad.

387 Note. A very rare species; in the future, its characteristics (especially the dimensions of its various parts) may be more accurately determined.

11. **D. subcapitata** Simmons, Vasc. Pl. Ellesmereland (1906) 87; N. Busch in Fl. Sib. et Or. Extr. III (1919) 343; Pohle, Dr. asiat. (1925) 94. – D. altaica auct. fl. arct., non Bge. – D. fladnizensis var. altaica Gelert in Bot. Tidskr. 21 (1898) 303. – D. martinsiana J. Gay, Bibl. Univ. de Geneve, Nouv. Sér. XXVIII (1840) 146 (nomen nudum). – D. pauciflora Schulz, Draba (1927) 95, non R. Br. – Ic.: N. Busch, l. c. (1919) 344; Simmons, l. c. (1906) t. I, f. 3–8.

Perennial, very compact, small, cespitose plants; leaves linear-lanceolate to lanceolate, 2.5–7 mm long, with robust midrib prominent at lower side, subacuminate, densely ciliate along margin, glabrous or glabrescent above, more or less densely covered with small, branched hairs below, and with longer simple hairs at apex; dead rosettes of leaves persist for a number of years compactly covering stem branches; stems 0.5–5 cm high, densely covered with small, delicate, branched hairs. Raceme 3–8-flowered, subcapitate at fruiting, looser in fruit and slightly elongated; pedicels thin, densely pubescent, in fruit distinctly (rarely slightly) shorter than silicle; sepals small, oblong-ovate, dark, more or less covered with soft, simple hairs; petals narrow, spatulate, slightly notched or rounded at apex, ca. 2 mm long, yellowish white; silicles oblong-elliptic or oval, dark green or lilac, 4–5 mm long (rarely longer), glabrous, rarely slightly pubescent; style very short, 0.2–0.3 mm long, inconspicuous; seeds brown. June–July.

Open stony tundra and sandy turfs. – Arctic: Nov. Z., Arc. Sib., Chuk. **Gen. distr.**: Arc., N. Am. Described from Ellesmere Land (Canadian archipelago). Type in Norway.

Note. The Siberian population is distinguished by a more elongated form of silicle, whereas in Novaya Zemlya they are shorter.

Series 4. **Polytrichae** Tolm. – Perennials, densely cespitose. Dead rosettes cover stem branches for a rather long time. Leaves flat, entire, ciliate along margin, pubescent with mostly simple, long hairs. Flowering stems scapoid, short. Flowers yellow. Silicles small, short. Style short.

388 1. Raceme 4–15-flowered; petals ca. 4 mm long; leaves conspicuously dilated toward apex; hairs nearly always simple . . . . 12. D. polytricha Ldb.

+ Raceme 2–5-flowered; petals 2.5–3 mm long; leaves nearly constant in width (not dilated); hairs mostly furcate . . . . 13. D. araratica Rupr.

12. **D. polytricha** Ldb., Fl. Ross. I (1842) 146; N. Busch in Fl. cauc. crit. III, 4 (1909) 433; Schulz, Draba (1927) 122. – D. pilosa β polytricha E. Rgl. in in Bull. Soc. Nat. Mosc., XXXIV, 2 (1861) 185 in nota. – D. reuteri Freyn in Bull. Herb. Boiss., 2 sér. I (1901) 257 (non Boiss. et Huet).

Perennial, quite compact, pulvinate, cespitose plants; leaves entire; oblong-obovate, tapering at base, rounded at tip, 4–7 mm long, with rather thick midrib, densely ciliate along margin, pubescent on both sides with long, almost exclusively simple hairs; stems numerous, at flowering 0.5–3.5 cm high (in fruit up to 5 cm), covered with long, simple (rarely furcate) hairs, or glabrous. Raceme 4–15-flowered, rather loose, in fruit slightly elongated; pedicels glabrous or pubescent (like stem); sepals ovate, glabrous; petals obovate, hardly emarginate, ca. 4 mm long, yellow; silicles oval to suborbicular, 3.5–6 mm long, slightly shorter than pedicels; style 0.3–0.4 mm long. June. (Plate XXII, Figure 7).

Rocks and taluses of the alpine zone. – Caucasus: W. and S. Transc. **Gen. distr.**: Arm.-Kurd. Described from Transcaucasia. Type in Leningrad.

13. **D. araratica** Rupr. in Mém. Ac. Sc. Pétersb. XV, 2 (1869) 114; N. Busch in Fl. cauc. crit. III, 4 (1909) 434; Schulz, Draba (1927) 123. – D. incompta Ldb., Fl. Ross. I (1842) 148 (quoad pl. ararat.), non Stev.

Perennial, small, compact, cespitose plants; stem branches covered with long-persisting dead rosettes; leaves oblong, nearly constant in width, obtuse, ciliate along margin, covered with long simple and short furcate hairs; racemiferous stems short, 0.5–1.5 cm high (in fruit up to 2 cm), rather stout, glabrous, 2–5-flowered; pedicels glabrous; sepals narrowly ovate, yellow, 2.5–3 mm long; silicles shortly oval to suborbicular, 2.5–4 mm long; style short (0.2–0.3 mm). June.

Alpine zone, from 1,900–2,000 m and higher. – Caucasus: S. Transc. (Alagez). **Gen. distr.**: Arm.-Kurd. Described from Mount Ararat. Type in Leningrad.

Series 5. **Pamiricae** Tolm. – Perennial, small cespitose plants. Leaves oblong, obtuse, densely covered with simple and branched hairs along margin and beneath, slightly pubescent or glabrous above. Flowers yellow. Silicles shortly ovate or suborbicular.

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1. Tufts compact; leaves small (2.5–4 mm long), more or less parallel at margins; petals 3–3.5 mm long . . . . 14. **D. korshinskyi** (O. Fedtsch.) Pohle.

+ Tufts rather loose; leaves 0.5–1 cm long, somewhat dilated toward apex; petals 3.5–5 cm long . . . . 15. **D. pamirica** (O. Fedtsch.) Pohle.

14. **D. korshinskyi** (O. Fedtsch.) Pohle in A. H. P. XXXI (1914) 484; ej. Dr. asiat. (1925) 134. – D. alpina var. androsacaefolia Korsh. in sched. – D. alpina var. korshinskyi O. Fedtsch. in A. H. P. XXI, 3 (1903) 266. – D. koiteseki O. Fedtsch. in sched. (nomen nudum). – D. pamirica Pohle in Schulz, Draba (1927) 113, p. pte.

Perennial, compactly cespitose; leaves oblong, more or less parallel at margins, subobtuse, 2.5–4 mm long, ca. 1 mm broad, with rather thick midrib, densely covered with small, branched and simple hairs below, slightly pubescent or glabrescent above, sometimes with longer, simple cilia along margin; old rosettes cover stem branches for several years. Flowering stems thin, more or less erect, 2–7 cm high, rather densely covered with soft hairs in lower part, glabrous in upper part. Fruiting raceme subcapitate, slightly elongating in fruit, 4–8-flowered; pedicels thin, glabrous; sepals oblong-ovate, dull green, more or less covered with fine, branched hairs; petals bright or pale yellow (in dried plants), narrowly obovate, 3–3.5 mm long; silicles shortly ovate to suborbicular, 2.5–4.5 mm long, glabrous; style 0.2–0.5 mm long. June–August. (Plate XXII, Figure 5).

Stony slopes of alpine zone. – Centr. Asia: Pam.-Al. **Gen. distr.**: Tib. Described from Darvaz. Type in Leningrad.

15. **D. pamirica** (O. Fedtsch.) Pohle in A. H. P. XXXI (1914) 485; Pohle, Dr. asiaticae (1925) 132; Schulz, Draba (1927) 113 (p. pte.). – D. alpina var. pamirica O. Fedtsch. in A. H. P. XXI, 3 (1903) 266.

Perennial, rather loosely cespitose; leaves oblong-spatulate, slightly dilated at apex, tapering at base, obtuse, 0.5–1 cm long, 1–2 mm broad, densely covered with branched and simple hairs along margin and beneath, slightly pubescent or glabrous above; stems 1.5–7 cm high, thin, erect or curved, pubescent with small, simple and branched hairs, often glabrous in upper part. Raceme compact, subcapitate, 2–15-flowered; pedicels glabrous; sepals narrowly ovate, dull green, covered with small, branched hairs; petals oblong-obovate, inconspicuously notched, yellow, 3.5–5 mm long; silicles shortly ovate, 4–5.5 mm long, up to 4 mm broad; style distinct, 0.5–1 mm long. July.

90 Stony and clayey slopes of the alpine zone, at an altitude of 3,500–5,000 m. – Centr. Asia: Pam.-Al. Endemic. Described from the Pamirs. Type in Leningrad.

Series 6. Oblongatae Tolm. – Perennials, small, compactly cespitose. Leaves flat, entire, obtuse, densely covered mostly with small, branching and stellate hairs. Flowering stems scapoid. Flowers yellow or yellowish white. Petals small, narrow. Silicles oval or oblong-elliptic; style rudimentary.

1. Flowers yellowish white or pale sulfur-yellow; silicles oblong-elliptic, acutish . . . . 16. **D. oblongata** R. Br.
+ Flowers bright yellow; silicles oval . . . . . . 17. **D. micropetala** Hook.

16. **D. oblongata** R. Br., List, pl. Ross. Voy. App. (1819) 143; Tolmatchev in Trav. Mus. Bot. XXII (1930) 168; Schulz, Draba (1927) 97 (p. pte). – D. leptopetala Th. Fries in Öfvers., Sv. Vet.-Ak. Förhandl., XXVI, 2 (1869) 130 (p. minima pte.); N. Busch in Fl. Sib. et Or. Extr. III (1919) 311 (p. min. pte); Pohle, D. asiat. (1925) 125 (p. minima pte.). – Ic.: Tolmatchev, l. c. (1930).

Perennial, small, compactly cespitose; leaves entire, oblong-obovate, rounded-subobtuse, 6–15 mm long, up to 4 mm broad, densely covered with small, branched and stellate hairs, sometimes with few, simple hairs along margins (in young plants – f. minor Tolm. – stellate hairs less developed and more simple hairs along margin); flowering stems leafless, straight or twisted above, 1–15 cm high (at flowering not taller than 5 cm), more or less densely covered with small, branched and stellate hairs. Raceme 3–13-flowered, compact at flowering, distinctly elongating in fruit; pedicels short, with small, branched hairs; sepals narrow, dull green, pubescent with small, branched and simple hairs; petals narrow, oblong-spatulate, straight-truncate, 2.5–3.5 mm long, yellowish white or light sulfur-yellow; silicles oblong-elliptic, acutish at both ends, 4–9 mm long, considerably or slightly longer than pedicels, more or less covered with small, simple hairs; style rudimentary. July–August. (Plate XXII, Figure 6).

Dry, clayey-stony tundra, rarely in dry turfs. – Arctic: Nov. Z., Arc. Sib. **Gen. distr.**: Arc. N. Am. Described from Arctic America. Type in England.

17. **D. micropetala** Hook. in Parry's Sec. Voy. App. (1825) 385. – D. lasiocarpa Adams in N. Mém. Soc. Nat. Mosc. III (IX) (1834) 248. – D. adamsii Ldb., Fl. Ross. I (1842) 177; Kryl., Fl. Zap. Sib. VI (1931) 1321. – D. astyla Bge. in sched. (nomen nudum). – D. leptopetala Th. M. Fries in Öfvers., Sv. Vet. Ak. Förhandl. XXVI, 2 (1869) 130 (p. maxima parte); N. Busch in Fl. Sib. et Or. Extr. III (1919) 311; Pohle, Dr. asiat. (1925) 125. – D. leptopetala auct. fl. sibir., Tolmatchev in Trav. Mus. Bot. XXII (1931) 167. – D. alpina var. oblongata Gelert in Bot. Tidskr., XXI, 3 (1898) 300. – D. oblongata Schulz, Draba (1927) 98 (p. pte.). – Ic.: N. Busch, l. c. 313 et tab. geogr. 313; Tolm., l. c. 391

Perennial, small, compactly cespitose; leaves entire, oblong-obovate, subobtuse, 6–15 mm long, pubescent on both sides with small, branched and stellate hairs with longer, simple and branched hairs along margin; racemiferous stems leafless, erect, rather stout, 1–10 cm high (at flowering not longer than 6 cm), slightly to rather densely covered with small, branched hairs, or glabrous. Raceme 2–7-flowered, very compact at flowering, looser in fruit, sometimes slightly elongated; pedicels short, pubescent with short, branched hairs; sepals narrowly ovate, dark, lilac, with long simple and shorter furcate hairs; petals narrow, oblong-spatulate, slightly incised or straight-truncate, 2.5–3.5 mm long, bright yellow; silicles ovate or broad-ovate, rarely ovate-elliptic, 4.5–8 mm long, as long as or longer than pedicels, slightly covered with small, simple hairs or glabrous; style rudimentary; seeds rufous. June–August.

Dry, or moderately moist and mossy, stony places in the tundra. – Arctic: Nov. Z., Arc. Sib. **Gen. distr.**: Arc. N. Am. Described from Arctic America. Type in England.

Series 7. **Alpinae** Tolm.– Perennials, compactly or rather loosely cespitose. Leaves oblong, obtuse, or subacuminate, pubescent with branched and simple hairs, sometimes ciliate along margins, rarely almost or completely glabrous. Flowering stems scapoid, rarely with 1–3 leaves. Flowers yellow or yellowish white, petals obovate. Silicles narrowly or broadly ovate, rarely elliptic, acutish at apex. Style short but distinct.

1. Leaves densely or slightly pubescent . . . . 2.
+ Leaves completely glabrous or pubescent only with small hairs along margin . . . . 10.
2. Leaves covered with small, branched or furcate, simple or stellate hairs, sometimes with stiff, simple cilia along margin, sometimes scarcely pubescent . . . . 4.
+ Leaves covered mostly with long, rigid, simple or simple and branched hairs; if stellate-hairy, then simple and branched hairs present as well . . . . 3.
392 3. Loosely cespitose; flowering stems rather tall (up to 13 cm); flowers large, petals 4.5–7 mm long . . . 28. D. olgae Rgl. et Schmalh.
+ Densely cespitose; flowering stems hardly exceeding rosettes of leaves; flowers small, petals ca. 3 mm long . . . 18. **D. behringii** Tolm.
4. Flowers yellowish white . . . . 5.
+ Flowers bright or pale yellow . . . . 6.
5. Leaves, stems, and pedicels densely pubescent . . . 22. D. pohlei Tolm .
+ Leaves rather sparsely pubescent; stems slightly pubescent; pedicels glabrous . . . . 24. **D. eschscholtzii** Pohle.
6. Leaves covered mostly with small stellate hairs; more or less loosely cespitose plants; stems rather tall, stout, straight or curved only in upper part . . . . 25. D. glacialis Adams.
+ Leaves covered mostly with branched, stellate, or simple hairs; tufts compact; stems low, often twisted . . . . 7.
7. Leaves covered above with simple hairs, beneath with simple and stellate hairs; silicles large, elliptic or oblong-elliptic, pubescent . . . . 23. D. macrocarpa Adams.
+ Leaves having on both sides, partly or exclusively, branched hairs; silicles glabrous or pubescent . . . . 8.
8. Silicles short-ovate, 3.5–5 mm long, inflated in lower part, with thin, relatively long (0.5–1 mm) style . . . . . 19. D. oreades Schrenk.
+ Silicles ovate or oblong-ovate, not inflated, with relatively short style . . . . 9.

9. Silicles ovate, glabrous or pubescent mostly near margins; racemes compact in fruit . . . . 20. D. alpina L.

+ Silicles ovate or oblong-ovate, evenly pubescent; raceme elongate in fruit . . . . 21. D. kjellmani Ltd.

10. Leaves covered with simple and stellate hairs along entire margin . . . . 26. D. ochroleuca Bge.

+ Leaves sparsely hairy along margin only at the lower part, or glabrescent . . . . 27. D. primuloides Turcz.

393 18. **D. behringii** Tolm., sp. nova in Addenda VII, p.486. — D. alpina Kom. in sched. Herb. Ac. Sc.

Perennial, compactly cespitose; leaves flat, oblong, sometimes subovate, 5—8 mm long, 2—3 mm broad, slightly tapering toward base, subobtuse, entire, densely ciliate along margin, more or less covered with stiff simple hairs above and simple and furcate hairs beneath; flowering stems low, hardly exceeding rosettes, 0.5—1 cm high at flowering, densely pubescent. Raceme compact, many-flowered; pedicels short, densely coverd with simple and furcate hairs; sepals ovate, pubescent with simple hairs; petals yellow, oblong-spatulate, more or less straight-truncate, ca. 3 mm long; silicles rather short. June (July ?). (Plate XXIII, Figure 8).

Rock streams. — Far East: Kamch. (Komandorskie Islands). Endemic. Described from Mednyi Island. Type in Leningrad.

19. **D. oreades** Schrenk in Fisch. et Mey., Enum. Pl. nov. II (1842) 56; Schulz, Draba (1927) 106; Kryl., Fl. Zap. Sib. VI (1931) 1320. — D. algida var. brachycarpa Bge., Verz. Pfl. östl. Altai (1836) 68. — D. pilosa var. oreades Rgl. in Bull. Soc. Nat. Mosc. XXXIV, 2 (1861) 183. — D. alpina Hook. f. et Thoms. in Journ. Linn. Soc. Bot. V (1861) 150 (non L.). — Pseudobraya kizyl-arti Korsh. in Mém. Ac. Sc. St. Pét., 8 série, IV, 4 (1896) 88. — D. tianschanica Pohle in A. H. P. XXXI (1914) 486. — D. kizyl-arti N. Busch in Fl. Sib. et Or. Extr. III (1919) 309. — D. affghanica Pohle, Drabae asiat. (1925) 127 (non Boiss.!) p. max. pte. — Ic.: N. Busch, l. c. (1919) 310 et tab. geogr. 381.

Perennial, compactly cespitose; leaves flat, entire, obovate-lanceolate, subobtuse, more or less densely covered with branched and simple hairs beneath and along margin, sometimes glabrescent above, 6—18 mm long, 1.5—4.5 mm broad; stems leafless (very rarely with one leaf), densely covered with long, thin, simple hairs (sometimes mixed with branched), 1.5—8 cm high. Raceme dense, subcapitate at flowering, slightly loose but not elongating in fruit; pedicels covered with long simple hairs; sepals oblong-ovate, pubescent; petals yellow (or yellowish white), obovate, minutely notched at margin, 3.5—5 mm long; silicles shortly ovate, acutish, inflated in lower part, 3.5—5 mm long, nearly as long as broad, glabrous or pubescent with small, simple and furcate hairs; style thin, 0.5—1 mm long. June—August. (Plate XXIV, Figure 2).

Alpine zone. — W. Siberia: Alt.; Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.**: Dzu.-Kash. Described from Kazakhstan (Dzhabyk Mountain). Type in Leningrad.

394 20. **D. alpina** L., Sp. pl. (1753) 642; Ldb., Fl. Ross. I (1842) 146; N. Busch in Fl. Sib. et Or. Extr. III (1919) 306; Pohle, Dr. asiat. (1925) 113; Schulz, Draba

(1927) 84; Kryl., Fl. Zap. Sib. VI (1931) 1319. – D. algida Kryl., Fl. Zap. Sib. VI (1931) 1320. – Ic.: Lindman, Bilder zur Nord. Fl, I, tab. 210B; N. Busch, l. c. (1919) 308 et tab. geogr. 309; Schulz, l. c. (1927) 85; Fernald in Rhodora (1934) pl. 290.

Perennial, compact, sometimes rather large, cespitose; leaves oblong or oblong-spatulate, entire, subacuminate, 5–20 mm long, 1.5–5 mm broad, covered with small simple, furcate, and branched hairs, ciliate at margin; stems leafless (rarely, with one leaf in anomalously developed plants), straight or nearly so, with simple, furcate, and branched hairs, 0.5–12 cm high. Raceme 3–12-flowered, subcapitate at flowering, looser in fruit but only slightly elongating; pedicels covered with simple and furcate hairs; sepals ovate, covered with furcate and simple hairs; petals bright or pale yellow, obovate, 3.5–5 mm long, rounded or obtuse-truncate; silicles ovate or oblong-ovate, obtuse or subacuminate, 4.5–9 mm long, 3–4.5 mm broad, glabrous or covered with small, simple and furcate hairs; style 0.5–0.7 mm long; seeds brown or rufous. June–August. (Plate XXIV, Figure 3).

Open, rocky tundra, rock streams in the Arctic and high-mountain zone. – Arctic: Nov. Z., Arc. Eur., Arc. Sib., Chuk.; W. Siberia: Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Dzu.-Tarb. **Gen. distr.**: Arc., Scand., Arc. Am., Mong. Described from northern Scandinavia. Type in England (?).

Note. Many species have been referred to D. alpina as varieties or simply as synonyms (especially those closely related), in particular D. korshinskyi, D. pamirica, D. oreades, D. kjellmani, D. macrocarpa, D. glacialis, D. micropetala, D. pilosa, and D. eschscholtzii, as well as some species not represented in the flora of the USSR.

The hybrid D. alpina × lactea, with pale yellow flowers and sparse indumentum (? = D. algida Adams in DC., Syst. II (1821) 337), is widely distributed in the Arctic. Some taxonomists have also classified it as D. ochroleuca.

21. **D. kjellmani** Lid., ex E. Ekman in Sv. Bot. Tidskrift XXV, 4 (1931) 478.

Perennial, compactly cespitose; leaves oblong-obovate, subobtuse, 5–10 mm long, 2–4 mm broad, glabrous or sparingly covered with simple hairs above, with small, stellate and furcate hairs beneath, ciliate at margin. 395 Stems leafless, with thin, simple and branched hairs, 4–6 cm high. Raceme 5–8-flowered, elongating in fruit; sepals ovate, sparingly simple-hairy; petals obovate, yellow, 4–5 mm long; silicles ovate or oblong-ovate, 4–7 mm long, 2–3.5 mm broad, pubescent; style 0.5–0.7 mm long. July–August.

Arctic: Nov. Z., Arc. Sib. (Vaigach Island). **Gen. distr.**: Arc. (Spitzbergen). Described from Spitzbergen and Novaya Zemlya. Type in Sweden (?).

22. **D. pohlei** Tolm. in Trav. Mus. Bot. Acad. Sc. USSR, XXIV (1932) 272. – Ic.: Tolm., l. c.

Perennial, compactly cespitose; leaves oblong-spatulate, slightly keeled, subacuminate, entire, densely covered with branched and stellate hairs, with simple and branched cilia along margin, 8–12 mm long; stems straight, leafless, rarely with 1–2 oblong-lanceolate leaves, smaller than the radical leaves, slightly pubescent. Flowering raceme subcapitate; pedicels short, densely pubescent; sepals green, more or less densely covered with simple, rather stiff hairs; petals yellowish white, obovate, inconspicuously emarginate, ca. 3.5 mm long; fruit unknown. July.

Arctic: Arc. Sib. (Central Taimir). Endemic. Described from Taimyr. Type in Leningrad.

23. **D. macrocarpa** Adams in Nouv. Mém. Soc. Nat. Mosc., III (1834) 349; Tolmatchev in Trav. Mus. Bot. Acad. Sc. URSS XXIII (1931) 226. — D. alpina f. glacialis Kjellm. in Vega-Exped. Vetensk, Iakktagelser, I (1882) 266. — D. alpina var. glacialis auct. plur. — D. alpina var. oblongata Simmons, Vasc. Plants in the Flora of Ellesmereland (1906) 81. — D. alpina var. adamsii Schulz, Draba (1927) 89 (p. pte.). — D. alpina var. macrocarpa Schulz, l. c. (1927) 89 (p. pte.). — Ic.: Tolm., l. c. (1931) 225, 227.

Perennial, compactly cespitose, often with few isolated rosettes; leaves oblong-lanceolate, slightly dilated toward apex, obtuse or subacuminate, entire, with a broad midrib, 7—12 mm long, 2—4 mm broad, more or less densely covered with simple hairs above, simple and furcate hairs beneath, with thin cilia along margin; stems leafless, more or less straight, 4—9 (3—11) cm high, with soft, simple and furcate hairs. Raceme 3—7-flowered, subcapitate at flowering, strongly elongating in fruit; pedicels densely covered with small, simple and furcate hairs, very short at flowering, strongly elongating in fruit (up to 12 mm), ascending; sepals ovate, usually
396 rufous, densely covered with simple hairs; petals sulfur-yellow, 4—5 mm long, obovate, equally or barely notched at apex; silicles oblong-elliptic, 7—12 mm long, densely covered with simple hairs; style short. July.

Dry, clayey-stony tundra. — Arctic: Nov. Z. (Gubin Bay near the Kara coast in Novaya Zemlya), Arc. Sib. **Gen. distr.**: Arc. N. Am. Described from the mouth of the Lena. Type lost (?).

24. **D. eschscholtzii** Pohle ex N. Busch in Fl. Sib. et Or. Extr. III (1919) 324; ej. Dr. asiat. (1925) 180. — D. affinis Ldb., Fl. Ross. I (1842) 148 (non Host). — D. alpina Cham. et Schlecht. in Linnaea I (1826) 22 (p. pte.). — D. repens var. affinis Rgl. in Bull. Soc. Nat. Mosc. XXXIV, 2 (1861) 187. — D. alpina var. pilosa f. pilosula Schulz, Draba (1927) 91 (non D. aspera var. pilosula Trautv.!). — Ic.: N. Busch, l. c. (1919) 325 (haud bene!).

Perennial, small, compactly cespitose; leaves flat, oblong-obovate or oblong-lanceolate, tapering gradually toward apex, subacuminate, entire, 6—7 mm long, 2—5 mm broad, covered with simple, stiff cilia at margin, sparsely covered with simple and furcate hairs above, more densely covered beneath with furcate and branched hairs; stems leafless, at flowering 3—13 cm high, often slightly curved in upper part, dispersely pubescent with branched and furcate hairs (sometimes mixed with simple ones), glabrescent above middle. Raceme loose, 3—12-flowered, strongly elongating in fruit; pedicels thin, long (at flowering up to 15 mm), glabrous or glabrescent; sepals elliptic, pubescent with many numerous simple and furcate hairs, pale; petals yellowish white, obovate, rather conspicuously emarginate, 4.5—6 mm long; silicles (immature) oblong-elliptic or narrowly ovate, distinctly shorter than pedicels, glabrous, with long style (0.75—1.25 mm). June—July. (Table XXIV, Figure 1).

Arctic: Chuk.; Far East: Kamch. Endemic. Described from the Chukchi coast of Bering Strait. Type in Leningrad.

Note. This species is related to D. alpina L. and, possibly, to D. ochroleuca Bge. It has been connected with D. sibirica (Pall.) Thell., due to a misunderstanding.

25. **D. glacialis** Adams in Mém. Soc. Nat. Mosc. V (1817) 106; Ldb., Fl. Ross. I (1842) 147; N. Busch in Fl. Sib. et Or. Extr. III (1919) 317; Pohle, Dr. 399 asiat. (1925) 119. — D. alpina var. glacialis Th. M. Fries in Bot. Notiser (1873) 5; Schulz, Draba (1927) 92. — D. alpina × dahurica E. Ekm. in Sv. Bot. Tidskr. XXIV, 2 (1930) 289. — Ic.: N. Busch, l. c. (1919) 318 et tab. geogr. 319.

Perennial, rather loosely cespitose; leaves flat, oblong-obovate-lanceolate, dilated toward apex and then cuneately tapering, subacuminate, 7–30 mm long, 2–6.5 mm broad, pubescent (generally rather slightly) with stellate and branched hairs, sometimes with many stiff, simple and furcate hairs along margin, entire (rarely with 1–2 inconspicuous teeth); stems leafless, more or less thick, straight or slightly curved in upper part, 5–25 cm high, covered with small, branched and stellate hairs, rarely mixed with simple hairs, sometimes glabrescent. Raceme 4–15-flowered, very compact at flowering, subcapitate, elongating in fruit; pedicels thick, covered with simple and branched hairs, rather abruptly recurved in fruit from axis; sepals oblong-ovate, pubescent with few long, simple hairs; petals oblong-obovate, straight-truncate or rounded, ca. 5 mm long, bright or sulfur-yellow; silicles oblong-ovate, 6–9 mm long, erect, glabrous, rarely slightly covered with simple and furcate hairs; style short (0.25–0.6 mm); seeds deep brown. July–August. (Plate XXIV, Figure 5).

Tundra slopes. — Arctic: Arc. Eur., Nov. Z., Arc. Sib. **Gen. distr.**: Scand. Described from the lower reaches of the Lena. Type in Leningrad.

26. **D. ochroleuca** Bge., Verz. Pfl. östl. Altai (1836) 69; Ldb., Fl. Ross. I (1842) 147; Schulz, Draba (1927) 92; Kryl., Fl. Zap. Sib. VI (1931) 1321. — D. gelida Turcz. in Bull. Soc. Nat. Mosc. (1838) I, 131 (nomen nudum); Fl. baic.-dahur. I (1842–1845) 132. — D. glacialis Kar. et Kir. in Bull. Soc. Nat. Mosc., XV (1842) 148 (non Adams!). — D. algida Trautv., ibid., I (1860) 101 (p. pte.). — D. alpina var. ochroleuca Rgl., ibid., XXIV (1861) 184. — D. ochroleuca sp. parva D. gelida N. Busch in Fl. Sib. et Or. Extr. III (1919) 314. — D. ochroleuca var. genuina Pohle, Dr. asiat. (1925) 122. — Ic.: N. Busch, l. c. (1919) 315 et tab. geogr. 316.

Perennial, more or less loosely cespitose; leaves rather fleshy, oblong-obovate, obovate, or obovate-lanceolate, cuneate, subacuminate or subobtuse at tip, entire or with 1–6 small, usually wide angled teeth near apex, with simple and furcate hairs at margin, glabrous at surfaces, 1–3 cm long, 2–8 mm broad; stems leafless, rarely with one or two oblong, subacuminate, entire or 1–2-toothed leaves, glabrous (like pedicels), rather thick, 2.5–24 cm high. Flowering raceme compact, loose and distinctly elongating 400 in fruit, 3–13-flowered; sepals ovate or elliptic, dark, dull green or grayish brown, glabrous; petals oblong-obovate, hardly notched or rounded, yellowish white or pale yellow, 4.5–6.5 mm long; silicles oblong-ovate, glabrous, 6–9.5 mm long, up to 4.5 mm broad, subacuminate, slightly longer than pedicels, more or less of the same length throughout the raceme; style ca. 0.5 mm long, rather thick. July. (Plate XXIV, Figure 6).

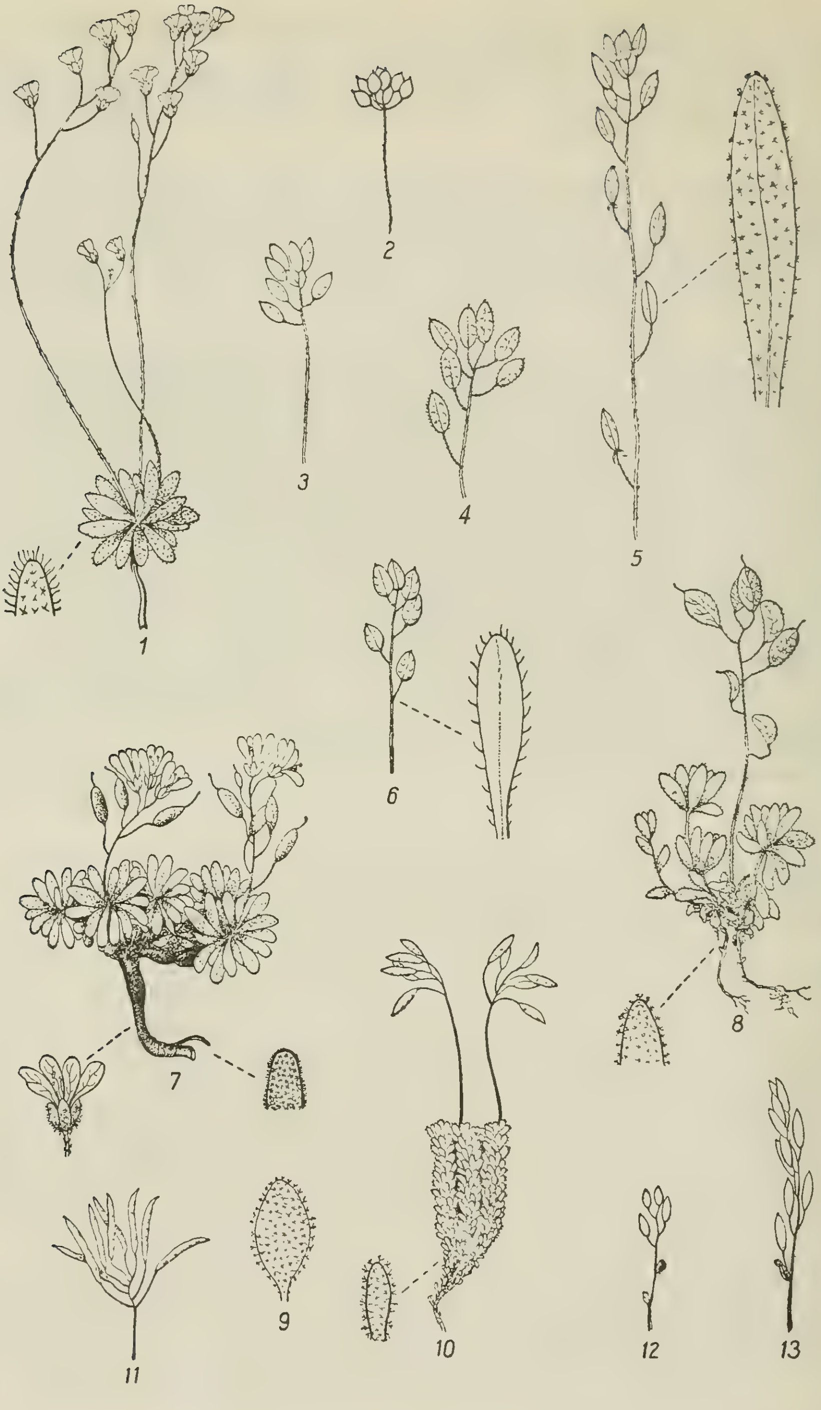

PLATE XXIV. 1 – Draba eschcholtzii Pohle ; 2 – D.oreades Sch.; 3 – D.alpina L.; 4 – D.kjellmani Ldb.; 5 – D.glacialis Adams ; 6 – D.ochroleuca Bge.; 7 – D.darvasica Lipsky ; 8 – D.lipskyi Tolm.; 9 – D.hissarica Lipsky ; 10 – D.molissima Stev.; 11 – D.longisiliqua Schmalh.; 12 – D.turczaninovi Pohle ; 13 – D.chamissonis Don.

Open formations at the alpine zone. — W. Siberia: Alt. E. Siberia: Ang.-Say., Dau., Lena-Kol. (?); Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.**: Mong. Described from Altai. Type in Leningrad.

Note. A hybrid, D. ochroleuca × sibirica Schulz, Draba (1927) 93 (syn. — D. ambigua Ldb., Fl. Ross. I (1842) 151) was described. D. ochroleuca, which was found in the Far North, is actually the hybrid D. alpina × lactea.

27. **D. primuloides** Turcz. in Bull. Soc. Nat. Mosc. (1838) I, 132 (nomen nudum). — D. gelida var. primuloides Turcz., Fl. Baic.-dahur. I (1842—1845) 132. — D. ochroleuca sp. parva D. primuloides N. Busch in Fl. Sib. et Or. Extr. III (1919) 314. — D. ochroleuca var. primuloides Pohle, Dr. asiat. (1925) 122; Schulz, Draba (1927) 93. — Ic.: N. Busch, l. c., 315

Perennial, loosely cespitose; leaves oblong-obovate or obovate-lanceolate, 1—3.5 cm long, 2—6 mm broad, subacuminate, entire, rarely 1—4-denticulate, completely or only in lower part glabrous, sparsely ciliate at margin, rather fleshy; stems leafless, rarely with 1—3 leaves, straight, rather thick, glabrous, 3—18 mm high. Raceme 3—15-flowered, compact at fruiting, usually strongly elongating in fruit; sepals ovate, dark, dull green; petals yellowish white or pale yellow, oblong-obovate, 4.5—5 mm long; silicles ovate or oblong-ovate, 5.5—7.5 mm long, up to 4 mm broad, glabrous; style ca. 0.5 mm long. July—August.

Alpine zone. — E. Siberia: Ang.-Say., Dau. **Gen. distr.**: Mong. Described from mountains of the Baikal area. Type in Leningrad.

28. **D. olgae** Rgl. et Schmalh. ap. Regel, Descr. Pl. nov. in A. P. Fedtschenko, Reise nach Turkest., 18 (1882) 8; Pohle, Dr. asiat. (1925) 138; Schulz, Draba (1927) 119.

Perennial, more or less loosely cespitose; leaves oblong-obovate or oblong-oblanceolate, entire, rarely with 1—2 small teeth, 7—15(4—20) mm long, 1.5—3 mm broad (sometimes up to 6 mm), subacuminate or obtuse, more or less densely covered with long, simple and branched hairs at margin and both sides, hairs sometimes mixed with small stellate hairs (then
401 pubescence is very dense); stems leafless, thin, usually slightly curved, 2.5—13 cm high, glabrous in upper part, pubescent below with small stellate hairs or longer simple and furcate hairs, or completely glabrous. Raceme many-flowered, rather compact at flowering, strongly elongating in fruit (up to 2.5—8 cm); pedicels thin, glabrous, long, ascending in fruit or abruptly divergent from axis, longer than silicle; sepals oblong-ovate, covered with simple and furcate hairs; petals obovate, rounded at margin, straight-truncate or hardly emarginate, yellow (often yellowish white when dry), 4.5—7 mm long; silicles lanceolate-elliptic or narrowly elliptic, 4.5—8 mm long, covered with small, simple hairs; style thin, 0.5—1 mm long; seeds small, brown. June—July.

Stony slopes, taluses, and meadows of the alpine zone, up to 3,900 m. — Centr. Asia: Dzu.-Tarb., Pam.-Al. **Gen. distr.**: Dzu.-Kash., Ind.-Him. (Chitral-Hindu Kush). Described from Zeravshan reservoir. Type in Leningrad.

Series 8. **Lacteae** Tolm. – Perennials, forming small tufts; leaves narrow, oblong, with a more or less thick midrib, entire or with few small teeth, ciliate at margin, covered with more or less small, simple or branched hairs, or glabrous. Flowering stems thin, leafless or with 1–3 small leaves. Flowers white or (rarely) yellowish white. Silicles small, oblong-ovate, oblong-elliptic or lanceolate, with short style, glabrous.

1. Leaves covered with simple and branched hairs . . . . 2.
+ Leaves covered only with simple hairs . . . . 6.
2. Leaves with simple, stiff cilia at margin, glabrous above, with stellate hairs beneath . . . . 30. **D. pseudopilosa** Pohle.
+ Leaves with simple or simple and furcate cilia at margin, more or less equally pubescent on both sides, or glabrous . . . . . . 3.
3. Leaves more or less evenly covered on both sides with simple and branched hairs or only with branched hairs . . . . 4.
+ Leaves covered with branched hairs mostly at apex, or without hairs on surfaces . . . . 5.
4. Leaves small (4–8 mm long); petals 3–4 mm long, sometimes yellowish; silicles elliptic, 3–4.5 mm long. Siberian plants . . . . 29. **D. pygmaea** Turcz.
+ Leaves longer (7–15 mm); petals 2.5–3.5 mm long, always pure white; silicles narrow, lanceolate, 5–10 mm long. Caucasian plants . . . . 35. **D. siliquosa** M. B.
402 5. Stems rather thick; flowers relatively large (petals 3.5–4 mm long); silicles ovate-lanceolate or elliptic, style ca. 0.5 mm long. Arctic plants . . . . 31. **D. lactea** Adams.
+ Stems thin; flowers relatively small (petals 2.5–3.5 mm long); silicles longer, with short style (ca. 0.2 mm). Caucasian plants . . . . 34. **D. subglabra** (Rupr.) Tolm.
6. Flowering stems leafless or with one or two leaves; leaves densely ciliate with stiff cilia . . . . 32. **D. fladnizensis** Wulf.
+ Stems always with leaves (1–3); leaves generally sparsely ciliate with thin cilia . . . . 33. **D. aradani** N. Busch.

29. **D. pygmaea** Turcz. in Bull. Soc. nat. Mosc. (1838) I, 87 (nomen nudum); N. Busch in Bull. Ac. Sc. (1918) 1633; Ej., Fl. Sib. er Or. Extr. III (1919) 339; Pohle, Dr. asiat. (1925) 87; Schulz, Draba (1927) 250. – D. lapponica Turcz., Fl. baic.-dahur. I (1842) 135, non Willd. – Ic.: N. Busch, l. c. (1919) 339 et tab. geogr. 340.

Perennial, small, compactly cespitose; leaves lanceolate or lance-linear, with a thick midrib, entire or with 1–2 teeth, obtuse or subacuminate, 4–8 mm long, 1–1.5 mm broad, with simple and furcate cilia along margin, and small, simple and branched hairs on both sides; flowering stems leafless (rarely with one leaf), thin, 1–6.5 cm high, glabrous. Raceme 2–8-flowered, rather compact at flowering, distinctly elongating in fruit; pedicels thin, glabrous; sepals ovate, glabrous or covered with simple hairs; petals white or yellowish white, obovate, 3–4 mm long; silicles elliptic, 3–4.5 mm long, 1.5–2 mm broad, slightly shorter than or as long as pedicels, glabrous; style ca. 0.5 mm long; seeds brown. June.

Stony places in the alpine mountain zone. – E. Siberia: Ang.-Say., Dau. **Gen. distr.**: Mong. Described from mountains in the Baikal area. Type in Leningrad.

30. **D. pseudopilosa** Pohle in Bull. Jard. Bot. Pétersb. XIV, 4–6 (1914) 469; Dr. asiat. (1925) 88; N. Busch in Fl. Sib. et Or. Extr. III (1919) 341. – D. alpina Cham. et Schl. in Linnaea I (1826) 2 (p. pte.). – D. lapponica Trautv. in A. H. P. X, 2 (1889) 492 (p. pte.). – D. pilosa B. Fedtsch. in Trav. Mus. Bot. III (1907) 142 (p. pte.). – D. stellata Kurtz in Engl., Bot. Jahrb. XIX (1895) 455 (p. pte.). – D. lactea var. pseudopilosa Schulz, Draba (1927) 263 (p. minima parte). – Ic.: N. Busch, l. c. (1919) 341 et tab. geogr. 342.

Perennial, small, rather densely cespitose; leaves linear-lanceolate, acutish, entire, rarely with 1–2 small teeth, keeled, with a thick midrib, 403 5–8 mm long, 1–1.5 mm broad, with simple, stiff cilia along margin, covered beneath with small stellate hairs, glabrous above; bases and midribs of dead leaves often persist on stem for a long time; flowering stems leafless, more or less straight, somewhat covered with small stellate hairs or glabrous, 4–8 cm high. Raceme at flowering rather dense, elongating in fruit; pedicels thin, glabrous; sepals oblong-ovate, sparingly covered with simple hairs; petals white, oblong-obovate, 3.5–4 mm long; silicles lanceolate, 8–9 mm long, 2 mm broad, longer than pedicels; style ca. 0.5 mm long. July.

Arctic: Arc. Sib., Chuk. **Gen. distr.**: Saint Lawrence Island. Described from Arctic Yakutia. Type in Leningrad.

31. **D. lactea** Adams in Mém. Soc. Nat. Mosc. V (1817) 104; Schulz, Draba (1927) 261; Kom., Fl. Kamch. II (1929) 184; Kryl., Fl. Zap. Sib. VI (1931) 1325. – D. androsacea Wahlb., Fl. Lapp. (1812) 174 (p. pte.). – D. wahlenbergii Hartm., Handb. Skand., Fl., 1 ed. (1820) 249. – D. lapponica Willd., apud DC., Syst. II (1821) 344; N. Busch in Fl. Sib. et Or. Extr. III (1919) 366; Pohle, Dr. asiat. (1925) 85. – D. wahlenbergii β heterotricha Lindbl. in Linnaea XIII (1839) 324; Ldb., Fl. Ross. I (1842) 150. – D. fladnizensis var. heterotricha Ball. in Bull. Soc. bot. Fr. VII (1860) 230. – C. fladnizensis var. lapponica Blytt, Norg. Fl. (1908) 382. – Ic.: Wahlb., l. c. (1812) f. 5; N. Busch, l. c. (1919) 337; Schulz, l. c. (1927) 217; Fernald in Rhodora (1934) pl. 291.

Perennial, small, rather loosely cespitose; leaves lanceolate, subacuminate, entire, 5–15 mm long, 1.5–4 mm broad, with a thick midrib at lower part, simple and furcate cilia along margin, slightly covered toward apex with small, branched and stellate hairs; stems leafless (rarely with one leaf), rather thick, 2–11 cm high. Raceme 3–10-flowered, compact at flowering, moderately elongating in fruit; pedicels rather stout, glabrous; sepals oval, dark, lilac, glabrous or covered only with simple hairs; petals white, broadly obovate, 3.5–4 mm long, rounded or hardly notched; silicles ovate-lanceolate or elliptic, acutish, 4.5–7 mm long, 2–3 mm broad, glabrous; style ca. 0.5 mm long. June–July.

Moderately damp, clayey and mossy tundras. – Arctic: Nov. Z., Arc. Eur., Arc. Sib., Chuk., An.; European part: V.-Kama (N. Urals); Far East: Kamch. **Gen. distr.**: Arc. Scand., N. Am., Bering. Described from the lower reaches of the Lena. Type in Moscow.

32. **D. fladnizensis** Wulf. in Jacq. Miscell. austr. I (1778) 147; Turcz., Fl. baic.-dahur. I (1842) 133; N. Busch in Fl. Sib. et Or. Extr. III (1919) 333; Pohle, Dr. asiat. (1925) 80; Schulz, Draba (1927) 253; Kryl., Fl. Zap. Sib. VI 404 (1931) 1324. — D. androsacea Wahlb., Fl. Lapp. (1812) 174 (p. pte.). — D. helvetica Schleicher apud DC., Syst., II (1821) 345. — D. lactea C. A. M. in Ldb., Ic. Fl. Alt. II (1830) 28 (non Adams!). — D. altaica B. Fedtsch., Fl. Evr. Ross. (1910) 476 (non Bge.). — D. samojedorum Rupr. in Beitr. Pflanzenk. Russ. R., VII (1850) 30, 52. — D. wahlenbergii α homotricha Lindbl. in Linnaea, XIII (1839) 324. — D. wahlenbergii var. glabrata Ldb., Fl. Ross. I (1842) 150. — Ic.: Wulf, l. c., f. 1; N. Busch, l. c. (1919) 334 et tab. geogr. 336; Schulz, l. c. (1927) 245.

Perennial, small, rather compactly cespitose; leaves lanceolate to linear-lanceolate, subacuminate, entire or (rarely) with 1—2 teeth, 4—15 mm long, 1—3 mm broad, with simple cilia along margin, sparsely covered on both sides with simple hairs or glabrous; stems leafless or with one (rarely two) minute, oblong, entire leaf, thin, glabrous, straight or slightly twisted, 3—11 cm high. Raceme 4—16-flowered, compact at flowering, loose and elongating in fruit; pedicels thin, glabrous; sepals oval, glabrous or covered with few simple hairs; petals white, oblong-obovate, rounded at apex, 2.5—3.5 mm long; silicles elliptic or oblong-elliptic, acutish, 4—7 mm long, 1—2.5 mm broad, glabrous; style short (0.2—0.4 mm); seeds brown. June—August.

Rocks and taluses, tundras and alpine mountain zone. — Arctic: Nov. Z., Arc. Eur., Arc. Sib., Chuk., An.; W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.**: Scand., Centr. Eur., Dzu.-Kash., Mong., N. Am. Described from Central Europe.

Note. A well-known hybrid is D. fladnizensis × nivalis (D. pseudonivalis N. Busch, 1918, et in Fl. Sib. et Or. Extr. III (1919) 331, ic. 332 et tab. geogr. 331).

33. **D. aradani** N. Busch in Bull. Ac. Sc. Pétersb. (1918) 1633; Fl. Sib. et Or. Extr. III (1919) 345. — D. chamissonis var. aradani Schulz, Draba (1927) 213. — Ic.: N. Busch, l. c., 346.

Perennial, small, cespitose; rosette leaves oblong-lanceolate, tapering at base, 5—12 mm long, 1—2 mm broad, entire or with few teeth, subacuminate, with thin, simple cilia along margin, glabrous or with dispersed, small, simple hairs; stems very thin, usually more or less curved, at flowering 4—6.5 cm high, glabrous, with 1—3 oblong-elliptic, entire or 1-toothed leaves smaller than rosette leaves. Raceme 3—8-flowered, rather loose, elongating in fruit; pedicels very thin, glabrous; sepals narrowly elliptic, glabrous;
405 petals white, oblong-obovate, slightly notched, 2.75—3 mm long; silicles (immature) lanceolate, longer than pedicels, glabrous; style short. June.

Rock crevices and mountain tops. — E. Siberia: Ang.-Say. (Aradan Bald Mountain). Endemic. Described from Aradan. Type in Leningrad.

Note. This species is very close to D. fladnizensis and differs very little from the taller specimens of the latter.

34. **D. subglabra** (Rupr.) Tolm. comb. nova. — D. siliquosa var. subglabra Rupr. in Mém. Ac. Sc. Pétersb., 7 sér., XV, 2 (1869) 117; Schulz, Draba (1927) 233. — D. siliquosa var. ciliata Rupr., l. c., 130 (p. max. pte.); N. Busch in Fl. cauc. crit. III, 4 (1909) 416 (p. max. pte.). — D. siliquosa var. glaberrima Rupr., l. c., 120; N. Busch, l. c., 419; Schulz, l. c., 233.

Perennial, small, more or less densely cespitose; rosette leaves oblong-lanceolate or linear-lanceolate, sometimes slightly dilated toward apex, entire or few-toothed, subacuminate, with simple cilia and shorter furcate and branched hairs along margin, subglabrous, sometimes completely glabrous, 7–15 mm long, 1.5–2.5 mm broad; stems thin, leafless or with one or two small, entire or edenticulate leaves, 2–10(18) cm high, glabrous. Flowering raceme more or less compact, strongly elongating in fruit; pedicels thin, glabrous; sepals oval, glabrous, pale; petals white, oblong-obovate, slightly notched, 2.5–3.5 mm long; silicles linear-elliptic, as long as or longer than pedicels, 6–8 mm long, 1.5–2 mm broad, glabrous; style ca. 0.2 mm long; seeds dark brown. July–August.

Rocks and alpine meadows, 2,500–3,500 m. – Caucasus: Cisc., Dag., E. Transc. **Gen. distr.**: Arm.-Kurd. Described from the Caucasus. Type in Leningrad.

Note. This species is close to the following one (D. siliquosa); it is readily distinguishable from it by the pubescence of its leaves (in typical forms) but is connected with it through a series of transitions.

35. **D. siliquosa** M. B., Fl. taur.-cauc. II (1808) 94; Ldb., Fl. Ross. I (1842) 151; Boiss., Fl. Or. I (1867) 301; Schulz, Draba (1927) 232. – D. siliquosa var. ramoso-pubescens N. Busch in Fl. cauc. crit. III, 4 (1909) 412. – D. siliquosa var. ciliata N. Busch, l. c., 416 (p. min. pte.).

Perennial, more or less compactly cespitose; rosette leaves oblong-lanceolate or linear-lanceolate, subacuminate, entire or few-toothed, slightly dilated toward apex, more or less densely covered with short, 406 branched and simple hairs, ciliate at margin with branched and furcate hairs and longer simple ones, 7–15 mm long, 1.5–2.5 mm broad; stems thin, straight or slightly twisted, seldom branching, leafless, or with one or two oblong, entire or slightly dentate leaves, more or less covered with short, branched hairs, or glabrous, 2–12(18) cm high. Flowering raceme rather compact, strongly elongating in fruit; pedicels thin, glabrous; sepals oval, glabrous; petals white, oblong-obovate, slightly emarginate, 2.5–3.5 mm long; silicles lanceolate-elliptic or lanceolate, narrow, 5–10 mm long, 1–2 mm broad, glabrous; style ca. 0.2 mm long; seeds small, rufous. June–August.

Rocks, rock streams, and alpine meadows, 2,000–3,500 m. – Caucasus: Cisc., Dag., E. and S. Transc. (without more precise indications). Endemic. Described from the Caucasus. Type in Leningrad.

Series 9. **Supranivales** Tolm. – Perennial, small, cespitose. Leaves oblong, ciliate along margin or completely glabrous. Flowering stems scapoid. Flowers white, large, few; pedicels long. Silicles large, elliptic, tapering toward base. Style short.

36. **D. supranivalis** Rupr. in Mém. Ac. Sc. Pétersb. 7 sér., XV, 2 (1869) 116; Boiss., Fl. Or. Suppl. (1888) 55; N. Busch in Fl. cauc. crit. III, 4 (1909) 420; Schulz, Draba (1927) 82. – Ic.: Schulz, l. c., 83.

Perennial, small, compact or more or less loosely cespitose; leaves oblong or oblong-obovate, subobtuse, 4–12 mm long, 1–3 mm broad, with simple and furcate cilia at margin, glabrous on both surfaces; flowering stems thin, leafless, glabrous, 2–8 cm high. Raceme 2–6-flowered, loose;

pedicels thin, long (at flowering up to 18 mm long), glabrous; sepals oval, glabrous, pale green; petals white, obovate, slightly emarginate, 5–7 mm long; silicles partly drooping, elliptic or obovate-elliptic, slightly tapering toward base, rounded at tip, 7–10 mm long, 3–4.5 mm broad, shorter than pedicels, glabrous; style 0.25–0.5 mm long. July.

Rocks in the alpine zone, 2,500–3,500 m. – Caucasus: Cisc., Dag. Endemic. Described from Bogos Range (Dagestan). Type in Leningrad.

Note. Var. leiophylla Lipsky differs from the type by its completely glabrous leaves (without cilia at margin).

Series 10. **Physocarpae** Tolm. – Perennial, compactly cespitose. Leaves oblong, entire, subobtuse, very densely pubescent with mostly branched hairs. Flowering stems scapoid, low, leafless, pubescent. Flowers yellow. Silicles ovate or suborbicular, inflated at maturity, with thin, rather long style (0.75–2 mm).

407 1. Silicles densely covered with branched hairs; style 1–2 mm long; flowers often many (up to 15 in raceme); petals 4–4.5 mm long . . . . 2.

+ Silicles glabrous; style up to 1 mm long; flowers always few (not more than 6–7 in raceme), larger [?] (petals 4–5.5 mm long) . . . . 39. **D. physocarpa** Kom.

2. Leaves densely covered with soft, rather long hairs; leaves not ciliate at margin or ciliate only at base of leaves . . . . 38. **D. fedtschenkoi** (Pohle) Gilg.

+ Leaves ciliate along entire margin with stiff, furcate and simple cilia, pubescent on surfaces with short hairs . . . . 37. **D. alberti** Rgl. et Schmalh.

37. **D. alberti** Rgl. et Schmalh. in A. H. P. V. (1877) 337; Pohle, Dr. asiat. (1925) 136; Schulz, Draba (1927) 119.

Perennial, compactly cespitose; leaves oblong, entire, subobtuse, 4–10 mm long, 1–3 mm broad, with stiff, furcate and simple cilia along margin, densely covered at both sides with stellate and furcate hairs, sometimes with stiff, simple hairs close to apex, sometimes glabrescent at base; flowering stems straight, leafless, 2–8 cm high, with short, branched hairs. Raceme 3–14-flowered, rather compact at fruiting, moderately elongating in fruit; pedicels thin, covered with short, branched hairs; sepals oblong-elliptic, densely pubescent with short, branched hairs; petals pale yellow, oblong-obovate, rounded at apex, 4–4.5 mm long; silicles elliptic, ovate or suborbicular, inflated, subacuminate at tip, 3–7 mm long (without style), 2–4 mm broad, shorter than pedicels, densely covered with short, branched hairs; style 1–2 mm long. July.

Clayey-stony places in the alpine zone (2,500–3,500 m). – Centr. Asia: T. Sh. Endemic. Described from the Aleksandrovskii [Kirghiz] Range. Type in Leningrad.

38. **D. fedtschenkoi** (Pohle) Gilg in sched. 1912 (nomem nudum!). – D. alberti var. fedtschenkoi Pohle, Dr. asiat. (1925) 136. – D. physocarpa var. fedtschenkoi Schulz, Draba (1927) 118.

Perennial, more or less compactly cespitose; leaves flat, oblong-obovate, tapering toward base, entire, subobtuse (or rounded-subobtuse), 5–12 mm long, 1.5–3 mm broad; densely gray-pubescent with soft and rather long, stellate, branched, and furcate hairs, sometimes with furcate and simple cilia along margin; stems leafless, 2–5.5 cm high, together with pedicels densely tomentose, with long, branched hairs; petals yellow, obovate, rounded at apex, 4–4.5 mm long; silicles oval, subacuminate at tip, 408 3.5–4.5 mm long (without style), 2–2.5 mm broad, inflated, densely covered with small, stellate hairs; style thin, 1–1.5 mm long. July–August.

Alpine zone (3,000–4,000 m). – Centr. Asia: T. Sh. Endemic. Described from Tyuz-Ashu Pass. Type in Leningrad.

39. **D. physocarpa** Kom. in Trav. Soc. Nat. Pétersb. XXVI (1896) 112; Pohle, Dr. asiat. (1925) 133; Schulz, Draba (1927) 118.

Perennial, small, compactly cespitose; leaves oblong-obovate, rounded-subobtuse, entire, 3.5–8 mm long, 1.25–2.5 mm broad, densely gray-pubescent with short, stellate, branched, and simple hairs, with few simple cilia at margin in lower part; stems leafless, 1–4 cm high, densely covered with soft, branched hairs. Raceme 2–7-flowered, not very compact; pedicels thin, long (up to 5 mm at flowering), pubescent; sepals oval, pubescent with branched hairs; petals oblong-obovate, almost rounded at apex, 4–5.5 mm long, yellow or pale yellow; silicles broadly ovate to suborbicular, inflated when ripe, 4–5 mm long (without style), 2.5–3 mm broad, glabrous; style thin, 0.75–1 mm long. July.

Alpine zone: rocks near glaciers, 2,500–4,300 m. – Centr. Asia: Pam.-Al. Endemic. Described from the upper reaches of Zeravshan (Kalla-Khona Gorge). Type in Leningrad.

Series 11. **Darwasicae** Tolm. – Perennials, compactly or more or less loosely cespitose; leaves oblong or broadly obovate, elongating at base, subacuminate, subobtuse or rounded-subobtuse, entire or 1-toothed, shortly gray-pubescent with stellate and branched hairs. Flowering stems scapoid (sometimes with one leaf in a certain species), short, densely pubescent. Flowers yellow (unknown in two species), large (petals 5–9 mm long). Silicles large, oblong-elliptic, elliptic, or ovate, pubescent, with long style (1.25–7 mm).

1. Leaves broadly obovate, rounded at apex . . . . . . **D. hissarica** Lipsky.
+ Leaves narrower, usually subobtuse, not rounded at apex . . . . 2.
2. Silicles shorter or somewhat longer than pedicels; style long (2–7 mm) . . . . 3.
+ Silicles 2–5 times longer than pedicels, very large (10–18 mm long without style); style not very long (up to 2 mm) . . . . 44. **D. odudiana** Lipsky.
409 3. Silicles oblong-elliptic, shorter than pedicels (the upper sometimes as long as pedicels); style thin, very long (2.5–7 mm) . . 4.
+ Silicles elliptic or ovate, slightly longer than pedicels (the lowermost sometimes as long as pedicels); style 2–3 mm long . . . . 41. **D. lipskyi** Tolm.

4. Tufts more or less loose; leaves sometimes denticulate . . . . 42. **D. arseniewi** (B. Fedtsch.) Gilg.

+ Tufts compact; leaves always entire . . . . . . 43. **D. darwasica** Lipsky.

40. **D. hissarica** Lipsky in A. H. P. XXIII, 1 (1904) 59; Pohle, Dr. asiat. (1925) 137; Schulz, Draba (1927) 115.

Perennial, compact or rather loose, sometimes large, cespitose; leaves broadly obovate, slightly attenuate at base, entire, rounded-subobtuse, densely gray-pubescent with very soft, stellate and branched hairs, 6–12 mm long, 2.5–5 mm broad; flowering stems leafless, 1–4 cm high, together with pedicels densely covered with short, stellate and branched hairs. Raceme rather loose, 6–13-flowered; pedicels thin, rather long; sepals oblong-ovate, densely covered with short, branched hairs; petals yellow, oblong-obovate, rounded or straight-truncate at apex, 5–6 mm long; silicles (immature) ovate, covered with short, simple and branched hairs; style rather long (1.25–1.5 mm). July. (Plate XXIII, Figure 9).

Rocks, in the alpine zone (3,300–4,100 m). – Centr. Asia: Pam.-Al. Endemic. Described from Gissar. Type in Leningrad.

41. **D. lipskyi** Tolm. sp. nova in Addenda VII, p. 487.

Perennial, more or less compactly cespitose; leaves oblong-obovate, attenuate at base, obtuse or subacuminate, entire, 10–18 mm long, 3–6 mm broad, densely covered with short, branched and stellate hairs; stems leafless (very rarely with one leaf), 1–6 cm high, covered with short, branched and stellate hairs. Raceme 2–7-flowered, at flowering rather compact, strongly elongating in fruit; pedicels densely pubescent; sepals narrowly oval, pubescent; petals yellow, oblong-obovate, rounded at apex, ca. 6 mm long; silicles ovate, elliptic or broadly so, longer than pedicels, rarely about as long, 6–13 mm long (without style), 4–6 mm broad, covered with short, simple and furcate hairs; style ca. 2 mm long. August (July–August ?). (Plate XXIV, Figure 8).

Centr. Asia: T. Sh. Endemic. Described from western Tien Shan (from the top of Ispai-Saya, 31 August 1928 (Smirnov)). Type in Leningrad.

410 42. **D. arseniewi** (B. Fedtsch.) Gilg. in sched. Herb. Ac. Sc. nom. – D. alpina var. arseniewi B. Fedtsch. in A. H. P. XXIII, 2 (1904) 390. – D. darwasica var. arseniewi Pohle, Dr. asiat. (1925) 110. – D. darwasica Lipsky ex Schulz, Draba (1927) 114 (p. pte.).

Perennial, loosely cespitose; leaves oblong-obovate, slightly attenuate at base, entire or 1–2-toothed at the widest part, subobtuse or subacuminate, 7–12 mm long, 2–5 mm broad, densely covered with rather long, branched and stellate hairs; stems leafless, usually twisted, in fruit 3.5–8.5 cm high, together with pedicels covered with very short, branched hairs. Raceme 2–6-flowered, strongly elongating in fruit; flowers unknown; silicles oval or oblong-elliptic, shorter than or as long as pedicels, 7–10 mm long (without style), 3–5 mm broad, covered with short, simple, furcate, and branched hairs; style thin, long (2.5–7 mm).

Alpine zone, 3,000–4,000 m. – Centr. Asia: T. Sh. Endemic. Described from the Ak-Turpak glacier (western Tien Shan). Type in Leningrad.

43. **D. darwasica** Lipsky in A. H. P. XXIII, 1 (1904) 60; Pohle, Dr. asiat. (1925) 109; Schulz, Draba (1927) 114 (p. pte.).

Perennial, very compact, small, cespitose; leaves oblong-obovate, attenuate at base, entire, subobtuse, 7–12 mm long, 1.5–3 mm broad, densely gray-tomentose with soft, branched, stellate and partly simple hairs; stems leafless, partly twisted, 1–8 cm high, together with pedicels densely covered with thin, branched and simple hairs. Raceme 4–11-flowered, rather compact at flowering, strongly elongating in fruit; pedicels thin; sepals narrowly elliptic, densely pubescent, pale, yellowish; petals yellow, oblong-spatulate or narrowly obovate, rounded or straight-truncate at apex, 5.5–8 mm long; silicles oblong-elliptic, sometimes obovate, 7–11 mm long (without style), 2.5–4.5 mm broad, distinctly shorter than the ascending, often slightly twisted pedicels, densely covered with short, branched hairs; style thin, filiform, 2.5–4.5 mm long. July–August. (Plate XXIV, Figure 7).

Rocks in the alpine zone (4,000–4,500 m). – Centr. Asia: Pam.-Al. Endemic. Described from Darvaz. Type in Leningrad.

44. **D. odudiana** Lipsky in A. H. P. XXIII, 1 (1904) 30, 62; Pohle, Dr. asiat. (1925) 110; Schulz, Draba (1927) 117.

Perennial, densely cespitose; leaves oblong-obovate, entire, subacuminate,
411 with a midrib prominent at base to nearly the entire length, 10–17 mm long, 3–5.5 mm broad, densely gray-pubescent with rather long, soft, branched hairs, sometimes with simple cilia at base and margin; stems leafless, short, up to 6 cm high in fruit, covered with short, branched hairs. Raceme 4–6-flowered, elongating in fruit; fruit unknown; silicles large, oblong-elliptic, 10–18 mm long (without style), 3.5–5.5 mm broad, 2–4 times as long as pedicels, covered with short, stellate hairs; style 1.5–2 mm long.

Rocks, 2,000–2,500 m. – Centr. Asia: Pam.-Al. Endemic. Described from Darvaz (Odudi and Obi-Motraun gorges). Type in Leningrad.

Series 12. **Tibeticae** Tolm. – Perennials, loosely or compactly cespitose; leaves oblong, densely covered on both sides with rather long, branched (stellate, furcate) hairs. Flowering stems leafless, rarely with one or two leaves. Raceme strongly elongating in fruit; flowers yellow or yellowish white; silicles oblong-ovate or lanceolate, large, with branched and stellate hairs, rarely glabrous; style well developed.

1. Pedicels glabrous or subglabrous . . . . 46. **D. alajica** Litw.
+ Pedicels densely pubescent . . . . 2.
2. Silicles oblong-ovate, 6–10 mm long . . . . 45. **D. talassica** Pohle.
+ Silicles lanceolate, 9–17 mm long . . . .
. . . . 47. **D. tibetica** Hook. f. et Thoms.

45. **D. talassica** Pohle in Bull. Jard. Bot. Pétersb. XIV, 4–6 (1914) 464. – Dr. asiat. (1925) 140; Schulz, Draba (1927) 121.

Perennial, compactly cespitose; leaves lanceolate or oblong-obovate, subacuminate or subobtuse, entire, with rather thick midrib, densely gray-pubescent (as the entire plant) with branched and stellate hairs, sometimes with few more stiff, simple hairs at apex and margin, 7–10 mm long, 1.5–2.5 mm broad; stems leafless, 1.5–10 cm high, together with pedicels densely covered with short, branched and stellate hairs. Raceme 3–13-flowered, more or less elongating in fruit; sepals narrowly ovate, yellowish, densely pubescent; petals in dry plants pale yellow or yellowish white, narrowly obovate, straight-truncate or inconspicuously notched at apex, 3.5–4 mm long; silicles oblong-ovate, 6–10 mm long, 2.5–3.5 mm broad, longer than pedicels, very densely covered with short, stellate hairs; style 0.5–0.75 mm long. July.

Stony places in the alpine zone. – Centr. Asia: T. Sh. Endemic. Described from Talass Ala-Tau. Type in Leningrad.

412 46. **D. alajica** Litw. in Trav. Mus. Bot. Ac. Sc. Pétersb. I (1902) 14; Pohle, Dr. asiat. (1925) 143; Schulz, Draba (1927) 116.

Perennial, loosely cespitose; leaves oblong or oblong-spatulate, subacuminate, obtuse, entire, attenuate at base, 6–19 mm long, 1.5–4 mm broad, with thin, prominent midrib at lower side, densely covered on both surfaces with rather long, stellate and furcate hairs; stems leafless, often twisted, 3–15 cm high, glabrous or glabrescent below. Raceme 6–20-flowered, rather compact subanthesis, later becoming loose, distinctly elongating in fruit; pedicels thin, glabrous or dispersely covered with short, stellate hairs; sepals elliptic, pale, densely pubescent with thin, branched hairs; petals light yellow, oblong-obovate, notched at apex, 4.5–6 mm long; silicles linear-lanceolate, 9–13 mm long, 1–2 mm broad, sometimes slightly twisted, the lower seldom shorter than the pedicels, covered with very short, branched and simple hairs, or glabrous; style 0.5–1 mm long.

Grassy and stony slopes, in the alpine zone, up to 4,000 m. – Centr. Asia: Pam.-Al. Endemic. Described from the Tarash natural boundary (Alai Valley). Type in Leningrad.

47. **D. tibetica** Hook. f. et Thoms. (var. α thomsonii) in Journ. Proc. Linn. Soc. Bot. V (1861) 152; Schulz, Draba (1927) 300. – D. turkestanica Rgl. et Schmalh. in Izv. Obshch. Lyub. Estestv. i Etnogr. XXXIV, 2 (1882) 7. – D. tranzschelii Litw. in Trav. Mus. Bot. Ac. Sc. I (1902) 14. – D. thomsonii Pohle, Dr. asiat. (1925) 141. – D. tibetica var. turkestanica Schulz, Draba (1927) 300.

Perennial, more or less loosely cespitose; leaves oblong, slightly attenuate at base, gradually tapering toward apex, subacuminate, entire (very rarely shortly toothed), 8–20(25) mm long, 1.5–4 mm broad, densely covered with rather long, branched and stellate hairs, sometimes with few simple cilia at margin; stems rather thin, leafless or with one or two oblong leaves (similar to rosette leaves) below, 5–25 cm high, together with pedicels covered with short, thin, branched hairs. Raceme 5–7-flowered, more or less loose, strongly elongating in fruit; pedicels thin, long; sepals oblong-ovate, pale, densely covered with furcate and branched hairs; petals yellowish white or yellow, oblong-obovate, hardly emarginate or straightly truncate, 4–5 mm long; silicles narrow, lanceolate, 9–17 mm long, 1.5–2.5 mm broad, as long as or longer than the pedicels (the lower sometimes shorter), more or less densely covered with furcate and stellate hairs; style 0.4–0.8 mm long; seeds large, rufous. June–July.

413 Slopes, in the alpine zone, 2,500–4,000 m. – Centr. Asia: Pam.-Al., T. Sh. **Gen. distr.**: Tibet. Described from western Tibet. Type in England.

Note. The variety leiocarpa (Lipsky) Schulz from western Tien Shan, with its glabrous silicles, differs from the type by its shorter silicles and relatively short pedicels.

Series 13. **Imereticae** Tolm. – Perennials, loosely cespitose. Leaves obovate, rounded at apex, entire, densely covered with short, stellate hairs. Flowering stems leafless. Flowers yellow. Silicles oblong-elliptic.

48. **D. imeretica** Rupr. in Mém. Ac. Sc. Pétersb., 7 sér., XV, 2 (1869) 291; N. Busch in Fl. cauc. crit. III, 4 (1909) 429; Schulz, Draba (1927) 130. – Schiweretzkia imeretica Rupr., l. c., 106, 291; Boiss., Fl. Or. Suppl. (1888) 53. – S. imeretina Radde, Mus. II, 54 ex N. Busch, l. c. – D. roegneri Stev. apud Rupr., l. c., 291 (nomen nudum). – Ic.: Somm. et Lev. in A. H. P. XVI (1900) tab. XI.

Perennial, loosely cespitose; stems stout, woody, covered in upper parts with relics of dead leaves; leaves obovate, rounded-obtuse, tapering toward base into a petiole, 6–18 mm long, 3–6 mm broad, densely gray-pubescent with stellate hairs; flowering stems leafless, often twisted, 4–12 cm high, covered below with soft, branched hairs, glabrous in upper part. Raceme 6–13-flowered, strongly elongating in fruit; pedicels glabrous in fruit, nearly perpendicular to axis; sepals elliptic, glabrous; petals ca. 4 mm long, yellow or yellowish white (?); silicles oblong-elliptic, sometimes broadest just above the middle, shorter than the pedicels (the upper as long as pedicel), 6–9 mm long, 2.5–4 mm broad, glabrous; style 0.5–1 mm long.

Rocks in the forest zone. – Caucasus: W. Transc. Endemic. Described from the environs of Kutaisi. Type in Leningrad.

Series 14. **Mollissimae** Tolm. – Perennials, compact, pulvinate, cespitose. Rosette leaves minute, short, canescent with short, branched (or stellate) hairs, sometimes also with longer, simple hairs. Flowering stems leafless, thin. Flowers yellow or white. Silicles narrow, glabrous, with relatively short style.

1. Leaf pubescent with long simple hairs and shorter branched
and furcate ones; petals yellow, 4–5 mm long, silicles oblong-
414 elliptic, with very short style (0.2–0.3 mm) . . . 49. **D. mollissima** Stev.
+ Leaves covered only with branched and stellate hairs; flowers
larger (petals 4.5–7 mm long); style 0.5–1 mm long . . . . 2.
2. Flowers white; silicles ovate-lanceolate or oblong-elliptic,
5–9 mm long . . . . 50. **D. ossetica** (Rupr.) Somm. et Lev.
+ Flowers yellow; silicles linear-lanceolate, 11–19 mm long . . . .
. . . . 51. **D. longisiliqua** Schmalh.

49. **D. mollissima** Stev. in Mém. Soc. Nat. Mosc. III (1812) 268; Ldb., Fl. Ross. I (1842) 149; Boiss., Fl. Or. I (1867) 298; N. Busch in Fl. cauc. crit. III, 4 (1909) 430; Schulz, Draba (1927) 128. – D. glacialis ε mollissima Rgl. in Bull. Soc. Nat. Mosc. XXXIV, 2 (1861) 186. – Ic.: Don, Gen. syst. I (1881) f. 49.

Perennial, compact, pulvinate, cespitose; leaves oblong, subobtuse, entire, slightly tapering toward base, with thin, prominent midrib at lower side, 3–6 mm long, 1.25–1.75 mm broad, densely gray-pubescent with long simple hairs and shorter, branched and furcate ones; flowering stems thin, leafless, 1.5–8 cm high, glabrous or covered below with short, branched hairs. Raceme 4–14-flowered, compact at flowering, loose and moderately elongating in fruit; pedicels glabrous, thin, often curved in fruit (then silicles partly nutant); sepals oval, more or less densely covered with simple and furcate hairs; petals yellow, oblong, obovate, slightly notched at apex, 4–5 mm long; silicles oblong-elliptic, subobtuse, 6–10 mm long, 1.5–2.5 mm broad, longer than pedicels (the lower sometimes equal in length), glabrous; style short (0.2–0.3 mm). July–August. (Plate XXIV, Figure 10).

Rocks in the alpine zone, 3,000–3,500 m; rarely down to 1,800 m. – Caucasus: Dag., W. Transc. (one locality in Abkhazia), E. Transc. Endemic. Described from Dagestan. Type in Helsingfors, cotype in Leningrad.

Note. Var. compacta Rupr. is distinguished by having compact tufts and short flowering stems.

50. **D. ossetica** (Rupr.) Somm. et Lev. in A. H. P. XIII, 1 (1893) 30; Rupr. in sched. Herb. Ac. Sc.; N. Busch in Fl. cauc. crit. III, 4 (1909) 431; Schulz, Draba (1927) 128. – D. mollissima β ossetica Rupr. in Mém. Ac. Sc. Pét., 7 sér., XI, 2 (1869) 112. – D. mollissima β compacta Radde, Grundz., ex N. Busch, l. c. – D. ossetica α typica Somm. et Lev., l. c., 31. – D. ossetica var. racemosa Somm. et Lev. in Albow, Prodr. Fl. Colch. (1895) 23; N. Busch, l. c., 432. – D. mollissima var. kusnetzowii 415 N. Busch in A. H. Jurjew. VII, 3 (1906) 144. – Ic.: Schmalh. in Ber. D. Bot. Ges. X (1892) tab. XVI, f. 10.

Perennial, compact, pulvinate, sometimes large, cespitose; stems covered with dead rosette leaves persistent for many years; leaves obovate, entire, subobtuse, tapering toward base, 3–6 mm long, 1.5–2 mm broad, densely gray-pubescent on both sides with short, branched hairs; flowering stems leafless, thin, glabrous or with short, branched hairs below, 3–9.5 cm high. Raceme 3–14-flowered, more or less loose, elongating in fruit; pedicels thin, long, glabrous; sepals ovate, with thin, branched and simple hairs; petals white, obovate, notched at apex, 4.5–7 mm long; silicles ovate-lanceolate or oblong-elliptic, 5–9 mm long, 1.5–2.5 mm broad, as long as or shorter than pedicels, glabrous; style 0.5–1 mm long. May–July.

Rocks at altitude of 1,200–3,000 m. – Caucasus: Cisc. Endemic. Described from North Ossetia. Type in Leningrad.

Note. Varieties: var. columnaris Somm. et Lev. is distinguished by its compact rosettes and short leaves, var. lipskyi N. Busch by its short flowering stems. The fruiting form of D. ossetica was described at first as var. racemosa Somm. et Lev., apparently in contrast to the typical flowering form of D. ossetica.

51. **D. longisiliqua** Schmalh. in Ber. Deutsch. Bot. Ges. X (1892) 286; N. Busch in Fl. cauc. crit. III, 4 (1909) 432; Schulz, Draba (1927) 129. – Ic.: Schmalh., l. c., tab. XVI, f. 3–6.

Perennial, compact, pulvinate, sometimes large (up to 25 cm in diameter), cespitose; leaves obovate to ovate, obtuse, tapering at base, entire, 3–6 mm long, 1.25–2.5 mm broad, densely gray-pubescent with short, stellate hairs; stems leafless, thin, 3–9 cm high, glabrous or with short, stellate hairs below.

Raceme 2–14-flowered, always more or less loose, not elongating in fruit; pedicels very thin, filiform, glabrous; sepals elliptic or ovate, with thin, simple and branched hairs, or glabrous; petals bright yellow, obovate, rounded at apex or straight-truncate or slightly notched, 5.5–7 mm long; silicles long, linear-lanceolate, often slightly falcately curved, 11–19 mm long, 1.25–2.5 mm broad, longer than pedicels, glabrous; style 0.5–0.75 mm long; seeds rufous. June (? May–June). (Plate XXIV, Figure 11).

Rocks in the alpine and subalpine zone, 1,200–2,600 m. – Caucasus: Cisc., Dag. Endemic. Described from the Northern Caucasus. Type in Leningrad.

Series 15. **Nivales** Tolm. – Perennial, small, cespitose. Rosette leaves 416 short, entire or few-toothed, densely covered with short, stellate and branched branched hairs; flowering stems scapoid or 1–5-leaved. Flowers white or pale yellow, short (petals up to 3.5 mm long). Silicles narrow, glabrous, more or less flattened, with short style.

1. Flowering stems and pedicels more or less densely pubescent . . . . 2.
+ Stems and pedicels glabrous or slightly pubescent . . . . 55. **D. turczaninovii** Pohle et N. Busch.
2. Rosette leaves obtuse, entire; flowering stems leafless or with one (very rarely 2) oblong, narrow, entire leaf . . . . 52. **D. nivalis** Liljebl.
+ Rosette leaves subacuminate, entire or few-toothed; stems with 1–5 ovate or oblong-ovate leaves often conspicuously dentate, rarely leafless . . . . 3.
3. Flowering stems thin, with 2–5 ovate leaves (often broader than rosette leaves); covered with short, branched and stellate hairs; silicles slightly longer than pedicels, the lower sometimes shorter . . . . 53. **D. camtschatica** Andrz.
+ Stems rather thick, one or two leaved or leafless; covered with longer furcate, branched, and stellate hairs; silicles about 3 times as long as pedicels . . . . 54. **D. chamissonis** G. Don.

52. **D. nivalis** Liljebl. in Sv. Vet. Akad. Handl. (1793) 208; Ldb., Fl. Ross. I (1842) 149; Schulz, Draba (1927) 209; Kom., Fl. Kamch. II, 183. – D. muricella Wahlb., Fl. Lapp. (1812) 174. – D. liljebladii Wallman in Liljebl., Svensk. Fl., 3 ed. (1816) 350. – D. stellata α nivalis Rgl. in Bull. Soc. Nat. Mosc., XXXIV, 2 (1861) 192. – D. kamtschatica N. Busch in Fl. Sib. et Or. Extr. III (1919) 329 (p. min. pte.). – D. nivalis var. genuina. – Pohle, Dr. asiat. (1925) 89 et 90. – Ic.: Lindeman, Bilder ur. Nord. Fl., I, tab. 211 B; Fernald in Rhodora (1934) pl. 195.

Perennial, compact, cespitose; leaves oblong-obovate, subobtuse, entire, rarely with 1–2 conspicuous teeth, 3–8 mm long, 1–2.5 mm broad, with robust prominent midrib at lower side, densely gray-pubescent on both sides with short, stellate hairs, sometimes with stiff, furcate and simple cilia below along margin; flowering stems 2–9 cm high, leafless or with one (rarely two) small, oblong or oblong-ovate leaf, together with pedicels more or less densely covered with short, stellate hairs. Raceme 2–10-flowered, compact, subcapitate at flowering, loose and elongating in fruit;

sepals oblong-elliptic, densely covered with short branched, furcate, and simple hairs; petals oblong-obovate, slightly notched at apex, 2.5–3.5 mm 417 long, milky white; silicles nearly ascending, narrowly elliptic or lanceolate, 6–9 mm long, ca. 1.5 mm broad, longer than pedicels (the lower sometimes equal in length), flattened, glabrous, often lilac; style short (ca. 0.3 mm); seeds dark grayish brown. June–August.

Dry, rocky, and sandy places. – Arctic: Nov. Z., Arc. Eur., Arc. Sib., Chuk., An.; E. Siberia: Dau. **Gen. distr.**: Scand., Arc. N. Am. Described from northern Scandinavia. Type in Sweden.

Note. Var. glabriuscula Pohle, described from Siberia, apparently represents the hybrid D. lactea × nivalis. Specimens from Arctic Yakutia resemble D. camtschatica by having flowering stems nearly always with leaves and strongly elongated fruiting racemes.

Var. caesia (Adams) Kjellm. (D. caesia Adams in Mém. Soc. Nat. Mosc. May (1817) 108), differing from type by its pale sulfur-yellow flowers and sepals densely covered with long simple hairs, is found in the lower reaches of the Lena and in Chukchi Peninsula; the latter character is common also in plants growing on Sibiryakova Island (Yenisei Gulf), but their flowers are white.

53. **D. camtschatica** Andrz. in sched. herb. Eschscholtz. (nomen nudum!). – D. stellata ε camtschatica Cham. et Schl. in Linnaea I (1826) 22. – D. frigida var. kamtschatica Ldb., Fl. Ross. I (1842) 150. – D. kamtschatica N. Busch in Fl. Sib. et Or. Extr. III (1919) 329 (p. max. pte.). – D. nivalis var. camtschatica Pohle, Dr. asiat. (1925) 93; (p. max. pte.). – D. nivalis prol. camtschatica Schulz, Draba (1927) 212. – Ic.: N. Busch, l. c. (1919) 330.

Perennial, more or less loosely cespitose; rosette leaves oblong or oblong-obovate, entire or with few inconspicuous teeth, subacuminate, 4–12 mm long, 1.5–2.5 mm broad, densely covered with short, branched and stellate hairs, canescent; stems thin, often curved, pubescent with short, branched hairs, with 2–5 small leaves rarely broader than rosette leaves, broad- or oblong-ovate, entire or (more often) with few teeth (more conspicuous than on rosette leaves) and densely pubescent, 2.5–19 cm high, sometimes with axillary branches. Raceme 4–16-flowered, compact, subcapitate at flowering, strongly elongating in fruit, less developed in branches; pedicels thin, densely covered with partly simple hairs; sepals narrowly elliptic, densely covered with relatively long, simple and branched hairs; petals oblong-obovate, slightly notched at apex, 2–3 mm long, white; silicles narrowly elliptic or lanceolate, 6–10 mm long, ca. 1.5 mm broad, usually longer (the lower sometimes shorter) than pedicels, glabrous (the young sometimes with few, short hairs); style short (ca. 0.3 mm). June–July.

418 Rocky places and mountain meadows. – Far East: Kamch., Okh. **Gen. distr.**: Ber. Described from Kamchatka. Type in Leningrad.

Note. Pohle's report that D. camtschatica is distributed in Arctic America and Greenland is obviously based on its erroneous separation from D. nivalis (D. n. var. genuina Pohle). Actually, the hybrid D. camtschatica × turczaninovii is encountered on the Okhotsk coast.

54. **D. chamissonis** G. Don, Gen. Syst. I (1831) 184; Schulz, Draba (1927) 203 (p. pte.). — D. stellata Cham. et Schl. in Linnaea, I (1826) 22. — D. turczaninovi var. obtusa Pohle et N. Busch in Bull. Ac. Sc. (1918) 1633; N. Busch in Fl. Sib. et Or. Extr. III (1919) 347; Pohle, Dr. asiat. (1925) 107. — D. obtusa Andrz. in sched. ex Pohle (nomen nudum).

Perennial, small, more or less compactly cespitose; rosette leaves oblong, 5—7 mm long, 1—1.5 mm broad, obtuse or subacuminate, entire, with rather coarse, branched, furcate, and stellate hairs, sometimes with simple cilia at margin; stems straight, rather thick, 3—8.5 cm high, with one or two small, ovate, few-denticulate or seldom entire leaves, more or less pubescent with thin branched-furcate hairs. Raceme 5—11-flowered, strongly elongating in fruit, with silicles nearly appressed to axis; pedicels short, with branched, furcate, and longer simple hairs; sepals ovate, with simple and furcate hairs; petals oblong-obovate, slightly notched at apex, ca. 3.5 mm long, white; silicles narrowly elliptic, subobtuse, 6—10 mm long, 1.5—2 mm broad, approximately 3 times as long as pedicels, glabrous; style short (ca. 0.3 mm); seeds brown, rather large. (Plate XXIV, Figure 13).

Arctic: Chuk. **Gen. distr.**: Ber. Described from the coast of the Chukchi Sea, Bering Strait. Cotype in Leningrad.

55. **D. turczaninovi** Pohle et N. Busch in Bull. Ac. Sc. (1918) 1633 (var. acutiuscula N. Busch); N. Busch in Fl. Sib. et Or. Extr. III (1919) 347 (var. acutiuscula); Pohle, Dr. asiat. (1925) 106 (var. genuina Pohle). — D. rigidfa Turcz., Fl. baic.-dahur. I (1842) 136 (p. pte.). — D. frigida γ baicalensis Ldb., Fl. Ross. I (1842) 149. — D. chamissonis Schulz, Draba (1927) 213 (p. pte.). — D. chamissonis var. baicalensis Schulz, l. c., 213. — Ic. N. Busch, l. c. (1919) 347.

Perennial, small, cespitose; rosette leaves oblong or linear-lanceolate, tapering toward base, acutish, with small, distinct teeth at margin or subentire, 5—15 mm long, 1—3.5 mm broad, covered with short, branched,
419 stellate, and furcate hairs (seldom with scattered simple hairs), sometimes with simple cilia at margin; stems more or less straight, rather thick in fruit, 1—8 cm high, with one or two ovate or oblong-ovate leaves conspicuously denticulate to entire, rarely leafless, glabrous or slightly covered with short, branched hairs. Raceme 4—14-flowered, compact at flowering, elongating in fruit; pedicels glabrous or slightly pubescent with simple-furcate hairs; petals white, oblong-ovate, more or less straight-truncate apex or slightly notched, 3—3.5 mm long; silicles lanceolate or ovate-lanceolate, subacuminate at tip, 6—9 mm long, ca. 2 mm broad, flattened, glabrous, longer than pedicels; style ca. 0.5 mm long; seeds dark brown, rather large. (Plate XXIV, Figure 12).

Alpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Okh.; Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.**: Dzu.-Kash., Mong. Described from southern Siberia. Type in Leningrad.

Series 16. **Cinereae** Tolm. — Perennials, compact or loosely cespitose. Rosette leaves oblong, entire or with inconspicuous teeth, densely and shortly gray-pubescent with stellate and branched hairs (sometimes also simple hairs), sometimes ciliate at margin. Flowering stems with 1—6 ovate or oblong-ovate leaves entire or with small but distinct teeth, rarely leafless, always hairy. Flowers white. Silicles elliptic, oblong-ovate or ovate, with convex valves, pubescent with short, stellate hairs. Style well developed.

1. Leaves without or with slightly developed cilia at margin; silicles 5–10 mm long; plant often rather large . . . . 56. D. cinerea Adams.

+ Leaves with well-developed cilia at margin; silicles 3–4 mm long; plant always small . . . . 57. D. parvisiliquosa Tolm.

56. D. cinerea Adams in Mem. Soc. Nat. Mosc. V (1817) 103; Ldb., Fl. Ross. I (1842) 173; N. Busch in Fl. Sib. et Or. Extr. III (1919) 381; Pohle, Dr. asiat. (1925) 66; Schulz, Draba (1927) 298. – D. arctica J. Vahl in Hornem. Fl. Dan. XIII 39 (1840) 5; Schulz, Draba (1927) 294. – D. rupestris Trautv. in Middend. Sib. Reise, I, 2 (1847) 58. – D. incana Meinsh. in Beitr. Pflanzenk. Russ. Reich. XXV (1871) 139. – D. muricella var. panschii Buch. et Focke in Zw. Deutsche Nordpolfahrt, II, 2 (1874) 34. – D. arctica var. typica Trautv. in A. H. P. V, I (1877) 22. – D. hirta var. dasycarpa Trautv. in A. H. P. V, 2 (1878) 507 (p. pte.). – D. hirta var. arctica Watson in Proc. Amer. Acad. XXIII (1888) 260. – D. magellanica ssp. cinerea Ekm. in Sv. Vet. Akad. Handl. LVII, 3 (1917) 33. – D. cinerea "sp. parva" 420 D. normalis N. Busch in Bull. Ac. Sc. (1918) 1646; ej. in Fl. Sib. et Or. Extr. III (1919) 381. – D. cinerea "sp. parva" D. hirsutiuscula N. Busch, l. c. (1918) 1646; ej., l. c. (1919) 382. – D. cinerea "sp. parva" D. akmolensis N. Busch, l. c. (1918) 1647; ej., l. c. (1919) 382. – D. cinerea "sp. parva" D. arctica N. Busch in Fl. Sib. et Or. Extr. III (1919) 382. – D. cinerea var. genuina Pohle, Dr. asiat. (1925) 67. – D. cinerea var. arctica Pohle, Dr. asiat. (1925) 67. – Ic.: N. Busch, l. c. (1919) 383 et tab. geogr. 384; Ekman in Sv. Bot. Tidskr., 24 (1930) pl. III, f. 8.

Perennial, loose, rarely more or less compact, cespitose; rosette leaves oblong, somewhat dilated toward apex, obtuse or subacuminate, entire or with few inconspicuous teeth, 5–20(–45) mm long, 1–6(–10) mm broad, densely gray-pubescent with short, stellate and branched hairs, sometimes with simple cilia in the lower part along margin; flowering stems straight or slightly twisted, simple or few-branched at flowering 2.5–21 cm, in fruit up to 40 cm high, with 1–6 oblong-ovate or ovate leaves, leaves entire or shortly denticulate (teeth more conspicuous than in rosette leaves), densely pubescent, leaves more or less evenly arranged along stem. Raceme 6–25-flowered, compact at flowering, very strongly elongating in fruit (up to 16 cm); pedicels thin, ascending in fruit, more or less densely hairy; sepals oblong-ovate, with simple and furcate hairs; petals white, 3.5–6 mm long, oblong-obovate, straight-truncate or rounded; silicles oblong-ovate or ovate, with convex valves, 5–10 mm long, 2–3 mm broad, the lower usually somewhat shorter than pedicels, the upper longer, more or less densely covered with short stellate hairs; style 0.5–1 mm long; seeds small, rufous. May–August. (Plate XXV, Figure 3).

Dry tundra slopes; forest zone – rocks. – Arctic: Nov. Z., Arc. Eur., Arc. Sib.; European part: Dv.-Pech. (Pechora in the Ural area); W. Siberia: Irt. (Lake Borovoe, former Kokchetav County); E. Siberia: Yenis., Lena-Kol., Ang.-Say. (near the Lena reservoir); Far East: Okh. **Gen. distr.**: Arc., Scand., Ber., N. Am. Described from the lower reaches of the Lena. Type in Moscow.

Note. Most of the varieties and races established by various authors do not differ significantly from the type. The exceptions are var. hirsuta Pohle, distinguished by the many simple hairs in its pubescence, and var. ajanensis (D. ajanensis N. Busch), with hairless silicles. These two forms are possibly hybrids. A hybrid, D. cinerea × hirta, is known.

57. **D. parvisiliquosa** Tolm. in Trav. Mus. Bot. Ac. Sc., XXIV (1932) 271. — Ic.: Tolm., l. c.

421 Perennial, small, compact, cespitose; leaves oblong-spatulate, gradually tapering toward apex, subobtuse, entire (seldom inconspicuously 1-toothed), 4—8 mm long, 1.5—2.5 mm broad, with simple and furcate cilia at margin, densely pubescent with branched and stellate hairs below, with branched, furcate, and (sometimes predominating) simple hairs above; stems 3—12 cm high, pubescent, with one or two ovate leaves distinctly denticulate and densely pubescent, rarely leafless. Raceme 4—12-flowered, moderately elongating in fruit; pedicels densely pubescent; sepals narrow, slightly pubescent; petals white, spatulate, 2.5—3 mm long; silicles elliptic, with convex valves, 3—4 mm long, as long as or longer than pedicels, covered with short branched hairs; style thin, 0.3—0.5 mm long; seeds rufous. July.

Dry stony tundra. — Arctic: Arc. Sib. Endemic. Described from eastern Taimyr. Type in Leningrad.

Series 17. **Rupestres** Tolm. — Perennial, small, compactly cespitose. Leaves denticulate or entire, acutish, ciliate at margin, covered with stiff, mainly simple and furcate hairs (sometimes partly short-stellate). Flowering stems scapoid or few-leaved, usually pubescent. Flowers white, relatively small. Silicles elliptic, oblong- or ovate-elliptic, glabrous or pubescent, with short styles (0.2—0.4 mm).

1. Plant densely gray-pubescent . . . . 58. **D. baicalensis** Tolm.
+ Plant more or less densely pubescent but not canescent . . . . 2.
2. Fruiting raceme not elongating; flowering stems short, not taller than 6 cm . . . . 60. **D. altaica** (C. A.M.) Bge.
+ Fruiting raceme always more or less (usually strongly) elongating; fruiting stems taller, sometimes up to 20 cm and more . . . . 3.
3. Silicles 3- or 4-valved . . . . 62. **D. kuznetsovii** (Turcz.) Hayek.
+ Silicles 2-valved . . . . 4.
4. Flowering stems leafless or with one or two ovate, crenate leaves. Northern plants . . . . 59. **D. norvegica** Gunn.
+ Flowering stems with 2—4 (sometimes up to 8) oblong-ovate or ovate, crenate or entire leaves. Central Asian plants . . . . 61. **D. parviflora** Schulz.

58. **D. baicalensis** Tolm., sp. nova in Addenda VII, p. 487.

422 Perennial, compactly cespitose; rosette leaves oblong, oblong-obovate, acutish, tapering toward base, entire or with 1—3 inconspicuous teeth, densely covered on both sides with stiff, simple hairs, ciliate at margin, 5—10 mm long, 1.5—3 mm broad; flowering stems leafless or with 1—3 leaves,

more or less straight, 6–13 cm high, covered with simple and furcate hairs (mixed with shorter branched hairs). Raceme 5–13-flowered, rather compact at flowering, strongly elongating in fruit; pedicels densely pubescent; sepals narrowly ovate, pale, with simple and furcate hairs; petals white, oblong-obovate, obtuse or slightly emarginate, 3.5–4 mm long; silicles (immature) elliptic or ovate-elliptic, shorter than or as long as pedicels, densely covered with short, simple and furcate hairs; style 0.3–0.4 mm long. June. (Plate XXV, Figure 1).

E. Siberia: Dau. (Svyatoi Nos Peninsula, near banks of Lake Baikal, 1,500–1,600 m). Endemic. Described from Dauria. Type in Leningrad.

59. **D. norvegica** Gunn., Fl. norveg. II (1772) 106; Schulz, Draba (1927) 220. – D. hirta L., Syst. nat. 10 ed. (1759) 1127 (p. pte.). – D. pyrenaica Oed., Fl. dan. I, 3 (1764) 6 (non L.). – D. hirta var. norvegica Liljebl. in Acta reg. soc. sc. Upsal. (1799) 56. – D. scandinavica α legitima Lindbl. in Linnaea XIII (1839) 322. – D. rupestris Bahl in Liebm., Ic. fl. dan. XIV, 41 (1845) 7; Pohle, Dr. asiat. (1925) 97. – D. hirta* rupestris Hartm., Handb. skand. Fl., 6 ed. (1854) 123. – D. fladnizensis* altaica Neuman et Alfvengren, Sveriges Fl. (1901) 475. – D. cacuminum Ekm. in Kgl. Sv. Vet. Handl. LVII, 3 (1917) 59. – Ic.: Lindman, Bilder ur Nordens Flora, I, tab. 210 B; Fernald in Rhodora (1934) pl. 301.

Perennial, small, compactly cespitose; leaves oblong-spatulate or lanceolate, acutish or subobtuse, tapering toward base, with small but distinct teeth or entire, 5–15(20) mm long, 1.5–4 mm broad with simple cilia at margin, covered with stiff simple, furcate and branched hairs (sometimes with smaller, stellate, dispersed hairs), sometimes glabrescent; stems 1–15 cm high, leafless or bearing one or two subacute, ovate, crenate leaves, with short, branched, furcate, and simple hairs, sometimes with stellate hairs or glabrescent. Raceme 4–18-flowered, compact at flowering, strongly elongating in fruit; pedicels short, covered with same hairs as stems or glabrescent; sepals narrowly elliptic, covered with simple and furcate hairs; petals white, obovate, hardly emarginate, 3–4 mm long; silicles oblong-elliptic or ovate-elliptic, 5–8 mm long, 1.5–2.5 mm broad, longer than pedicels (sometimes 2–3 times; the lower sometimes shorter), parallel to axis, flattened, with short, simple and stellate
423 hairs, or glabrous; style short (ca. 0.3 mm long). June–July.

Dry, open tundra. – Arctic: Nov. Z., Arc. Eur., Arc. Sib. (Vaigach Island). **Gen. distr.**: Arc., Scand., N. Am. (Atlantic area). Described from the mountains of Norway. Type in Norway ?

60. **D. altaica** (C. A. M.) Bge. in Del. Sem. H. Dorpat. (1841) 8; Ldb., Fl. Ross. I (1842) 754; N. Busch in Fl. Sib. et Or. Extr. III (1919) 326; Pohle, Dr. asiat. (1925) 100; Schulz, Draba (1927) 216; Kryl., Fl. Zap. Sib. VI (1931) 1323. – D. rupestris β altaica C. A. M. in Ldb., Fl. Alt. III (1831) 71. – Braya glacialis Korsh. in sched. Herb. Ac. Sc. (nomen). – Ic.: N. Busch, l. c. (1919) 328 et tab. geogr. 329; Schulz, l. c. (1927) 217.

Perennial, small, compactly cespitose; leaves oblong or lanceolate, tapering toward base, subacuminate, 1–2 toothed or entire, 5–15 mm long, 1–2 mm broad, with stiff, simple, furcate and tripartite hairs, ciliate at margin, very rarely glabrous flowering stems short, 0.5–6 cm high, with one or two (rarely up to 4) leaves similar to rosette leaves, rarely leafless, seldom with one lateral branch, with long, simple hairs or subglabrous, rarely completely glabrous. Raceme 4–12-flowered, compact at flowering, glabrescent, more loose in fruit but not elongating; pedicels short, glabrous or covered with long, simple and furcate hairs; sepals oblong-elliptic, pubescent with few simple and furcate hairs; petals white, oblong-obovate, straight-truncate or slightly emarginate, 2–2.5 mm long; silicles elliptic, ovate, or oblong-elliptic acutish, 3–6 mm long, glabrous, rarely with short, simple hairs at margins of valves; style short (0.2–0.3 mm); seeds brown. June–July. (Plate XXIV, Figure 2).

Stony places in the alpine zone. Up to 4,500–5,000 m in the Pamirs. – W. Siberia: Alt., Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.**: Dzu.-Kash., Mong., Tib. Described from eastern Altai. Type in Leningrad.

Note. Varieties: var. glabrescens Lipsky (leaves very sparingly pubescent or glabrous, stems glabrous); var. modesta (W. W. Sm. p. sp.) Schulz (rosette leaves longer than in type; stems 3-leaved). A hybrid, D. altaica × pamirica (D. uczkolensis B. Fedtsch. 1906), is known only from Shugnan.

61. **D. parviflora** Schulz, Draba (1927) 273 (excl. pl. sibir.). – D. subamplexicaulis var. hirsutifolia Pohle, Dr. asiat. (1925) 45. – D. hirsutifolia Tolm. in sched. Herb. Ac. Sc. URSS.

424 Perennial, small, rather compactly cespitose; rosette leaves oblong, slightly dilated toward apex, subacuminate or obtuse, few-denticulate or entire, 7–25 mm long, 2–5 mm broad, more or less densely covered with rigid, simple hairs, partly mixed with furcate and branched ones; stems simple 3–24 cm high, with rigid, simple and furcate hairs, bearing 2–4(8) oblong-ovate or ovate leaves, obtuse or subacuminate, entire or sparingly denticulate, more or less densely covered with same hairs as rosette leaves. Raceme 4–20-flowered, compact at flowering, elongating in fruit; pedicels with simple and furcate hairs; sepals oblong-ovate, simple-hairy, sometimes glabrescent; petals white, oblong-obovate, hardly emarginate, 3–4.5 mm long; silicles oblong-elliptic or elliptic-lanceolate, nearly ascending, 7–10 mm long, 1.5–2 mm broad, longer than pedicels, glabrous; style short (ca. 0.3 mm long). June–July.

Stony places in meadows of the alpine zone; seldom descending to the forest zone. – Centr. Asia: Pam.-Al., T. Sh., Dzu.-Tarb. **Gen. distr.**: Dzu.-Kash. Described from Central Asia. Type in Leningrad.

62. **D. kuznetsovii** (Turcz.) Hayek in Beih. Bot. Centralbl. XXVII, 1 (1911) 172; N. Busch in Fl. Sib. et Or. Extr. III (1919) 358; Pohle, Dr. asiat. (1925) 51. – Holargidium kuznetsovii Turcz. in Bull. Soc. Nat. Mosc. I (1838) 152 (nomen); ej., Fl. baic.-dahur. I (1842) 148 (descr.); Ldb., Fl. Ross. I (1842) 156. – D. subamplexicaulis f. kuznetsovii Kryl., Fl. Zap. Sib. VI (1931) 1328. – D. daurica Schulz, Draba (1927) 274, p. pte. – Ic.: N. Busch, l. c. (1919) 359 et tab. geogr. 360.

Perennial, small, rather compactly cespitose; rosette leaves oblong-spatulate or oblong-obovate, acutish, with distinct, sometimes rather

large teeth, rarely subentire, 6–20(30) mm long, 1.5–5(8) mm broad, densely covered with stiff and long, simple hairs, partly mixed with shorter, furcate and branched ones; stems straight, rather thick, 4–18(25) cm high, simple or somewhat branching, densely covered in lower part with stiff, simple and furcate hairs, glabrescent in upper part, bearing 2–6 oblong-ovate or oblong-elliptic, crenate or subentire leaves, less pubescent than rosette leaves due to fewer simple hairs. Raceme 3–18-flowered, compact at
427 flowering, shiplike, elongate in fruit; pedicels short, thick, glabrous or nearly so; sepals elliptic, with few long, simple hairs; petals white, oblong-obovate, emarginate, 3–4 mm long; silicles upright, appressed to axis, oblong-elliptic, 5–9 mm long, 1.25–2 mm broad, 3–4-valved, inflated when ripe, 1.5–3 times as long as pedicels, glabrous; style rudimentary; seeds small, rufous. July.

Stony slopes and rock streams. – W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau. **Gen. distr.**: Mong. Described from the Eastern Sayans. Type in Leningrad.

Note. Certain Eastern-Sayans plants with branching and taller (to 25 cm) stems, found together with the typical form, may be separated as var. ramosa Tolm.

Series 18. **Hirtae** Tolm. – Perennial (a few species sometimes biennial), more or less loosely cespitose. Leaves flat, oblong, often denticulate at margin, with short, stellate and branched hairs (sometimes mixed with simple ones). Flowering stems usually rather tall, nearly always with few leaves infrequently broader than rosette leaves and with more developed teeth. Flowers white or yellowish white. Raceme strongly elongating in fruit. Silicles lanceolate, elliptic, or ovate-lanceolate, glabrous or more or less pubescent with simple, furcate hairs, rarely contorted; style short.

1. Hairs mostly short, subsessile, stellate . . . . 68. **D. hirta** L.
+ Hairs longer, thin, branched, sometimes mixed with short ones . . . 2.
2. Rosette leaves usually with distinct teeth, rarely subentire; leaves on stem of larger specimens distinctly dentate. Southern Siberian and Central Asian plants . . . . 63. **D. subamplexicaulis** C. A. M.
+ Rosette leaves entire or with broad but indistinct teeth; leaves on stems entire or with slightly developed teeth. Arctic and Kamchatka plants . . . . 3.
3. Pedicels densely covered with furcate hairs; petals ca. 3 mm long . . . . 64. **D. prozorovskii** Tolm.
+ Pedicels glabrous or slightly pubescent; petals ca. 5 mm long . . . . 65. **D. juvenilis** Kom.

63. **D. subamplexicaulis** C. A. M. in Ldb., Fl. Alt. III (1831) 77; Ldb., Fl. Ross. I (1842) 151; Kryl., Fl. Zap. Sib. VI (1931) 1327; Schulz, Draba (1927)
428 273. – D. subamplexicaulis var. genuina et var. ramosa Pohle, Dr. asiat. (1925) 44–46. – D. dasycarpa C. A. M. in Ldb., Fl. Alt. III (1831) 79; Ldb., Fl. Ross. I (1842) 152; Turcz., Fl. Baic.-dahur. I (1842–1845) 140; Kryl., Fl. Zap. Sib. VI (1931) 1328; Schulz, Draba (1927) 272. – D. confusa

(425)

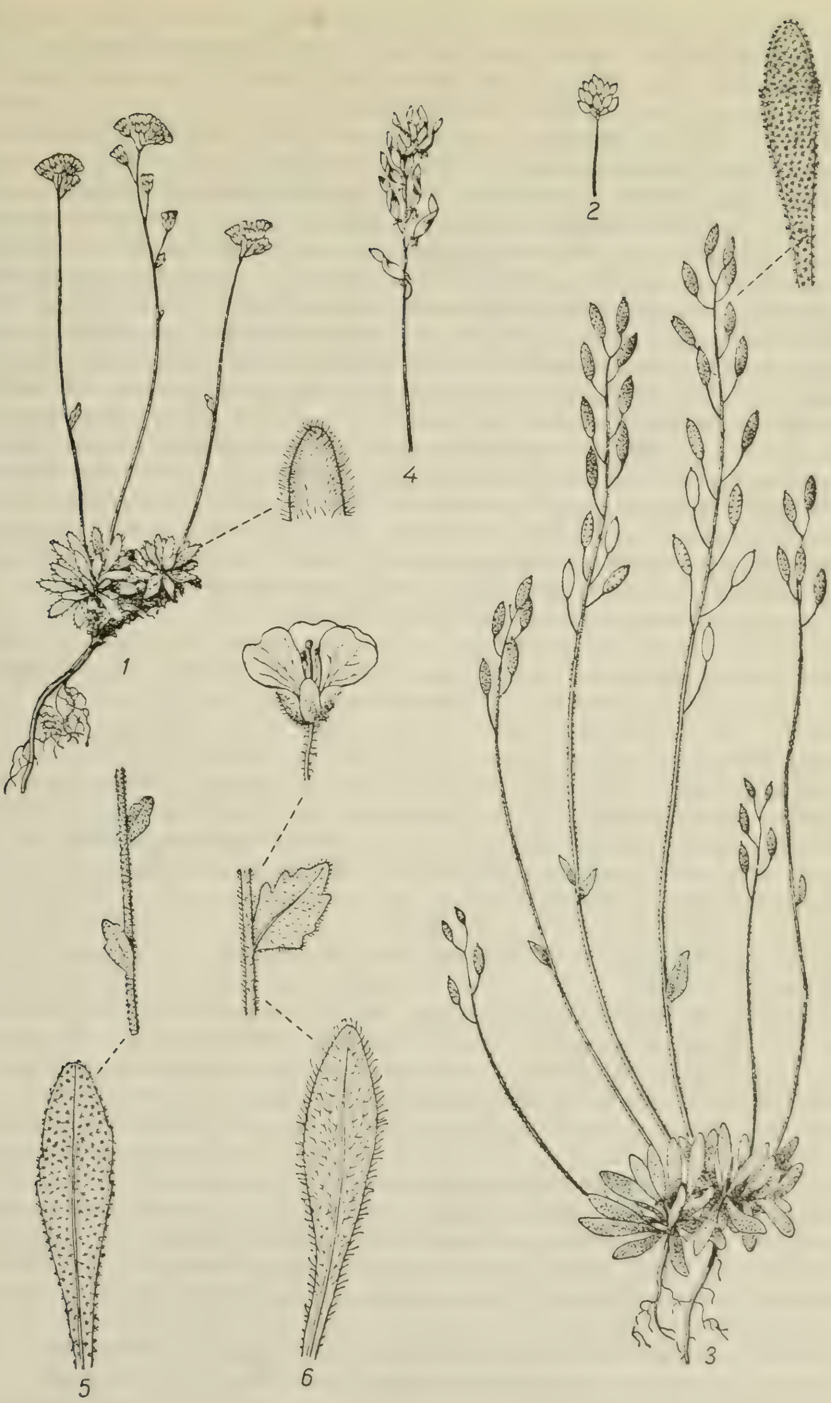

PLATE XXV. 1 – D. baicalensis Tolm., and part of a leaf; 2 – D. altaica (C.A.M.) Bge., fruit; 3 – D. cinerea Adams with fruit and leaves; 4 – D. lasiophylla Royle with fruit; 5 – D. cardaminiflora Kom., part of stem and leaf; 6 – D. sachalinensis F. Schmidt, flowers, part of stem and leaf.

Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 30. — D. ambigua Ldb., Fl. Ross. I (1842) 151. — D. daurica N. Busch in Fl. Sib. et Or. Extr. III (1919) 355, non DC.; Schulz, Draba (1927) 274 (p. pte.). — D. hirta var. dasycarpa Trautv. in Bull. Soc. Nat. Mosc. I (1860) 105. — D. magellanica ssp. cinerea E. Ekm. in sched. pl. alt. — Ic.: Ldb., Ic. pl. Ross. III (1831) tab. 264, 265; N. Busch, l. c. (1919) 357 et tab. geogr. 358.

Perennial, sometimes biennial, small, usually loosely cespitose; rosette leaves oblong, dilated toward apex or at middle, obtuse or acutish, 6—40 mm long, 1.5—10 mm broad, with distinct, often broad teeth, sometimes subentire, with short, simple and branched (2- and 3-partite), sometimes stellate hairs, sometimes glabrescent above; flowering stems simple or branching, 2—30(38) cm high, with short, branched and simple hairs, sometimes with stellate ones, leaves 2—8, more or less evenly arranged, broadly ovate or oblong-lanceolate, wide and subamplexicaul at base, large-toothed (rarely subentire), acutish, pubescent like rosette leaves with usually shorter but sometimes longer hairs. Raceme 3—22-flowered, compact at flowering, strongly elongating in fruit; pedicels glabrous or with simple and furcate hairs; sepals oblong-elliptic or ovate-elliptic, simple-hairy or glabrescent; petals white, obovate, rounded or slightly emarginate, 3.5—5 mm long; silicles oblong-elliptic or oblong-ovate-elliptic, 7—14 mm long, 2—3 mm broad, glabrous or with short, simple and furcate hairs; style short (0.25—0.5 mm); seeds dark brown. July—August.

Grassy and stony places, mainly in the alpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb., T. Sh. Gen. distr.: Mong. Described from Altai. Type in Leningrad.

Note. The record that this plant was found in the Far East (Ayan) was evidently due to confusion of labels.

Two varieties are established: var. genuina Pohle — flowering stems simple, not taller than 15—20 cm; leaves sparsely pubescent, especially in upper part; var. ramosa Pohle — stems branching throughout or in part but with axis more prominent, higher (17—38 cm); leaves larger, distinctly dentate, the cauline broadly ovate or ovate-rhombic.

429 64. **D. prozorovskii** Tolm. in Trav. Mus. Bot. Ac. Sc. URSS (1930) 173. — Ic.: Tolm., l. c., 174.

Perennial, loosely cespitose; leaves ovate or rhombic, tapering toward base, acutish, entire or with few, inconspicuous teeth, 20—25 mm long, 5—10 mm broad, more or less covered on both sides with short and thin, branched and furcate hairs, and some stellate ones, often with stiffer, furcate and simple hairs along margin; stems simple, leafless or with one or two small, ovate, tapering, acutish leaves, 8—12 cm high (at flowering), with thin, furcate, branched, and simple hairs. Raceme many-flowered, rather compact at flowering; pedicels very thin, at flowering 2—5 mm long, furcate-hairy; sepals oblong-ovate, with few simple hairs; petals oblong-obovate, hardly emarginate, ca. 3 mm long, white (yellowish ?); silicles (immature) oblong-elliptic, 7—8 mm long, ca. 2 mm broad, glabrous; style ca. 0.5 mm long. June.

E. Siberia: Lena-Kol. (Khatanga River, 72°N., near the timberline). Endemic. Described from the Khatanga River. Type in Leningrad.

65. **D. juvenilis** Kom. (emend.) in Fedde, Repert. XIII (1914) 163 (p. pte.); Kom., Fl. Kamch. II, 184. – D. hirta var. gracilis N. Busch in Bull. Ac. Sc. (1918) 1641; ej. in Fl. Sib. et Or. Extr. III (1919) 350 (p. pte.). – D. hirta juvenilis Pohle, Dr. asiat. (1925) 36 (p. pte.). – D. daurica var. major Schulz, Draba (1927) 274 (p. pte.). – Ic.: N. Busch, l. c. (1919) 354, a.

Perennial (or biennial), forming small tufts or solitary rosettes; leaves oblong-obovate, tapering into a petiole, rounded-subobtuse or acutish, entire or with few broad, obtuse teeth, 8–18 mm long, 2.5–8 mm broad, sparingly covered at both sides and margin with short, furcate and branched (usually tripartite) hairs, sometimes with stiffer, furcate and simple cilia at margin, sometimes glabrescent; stems thin, ascending, more or less straight or slightly curved, not ramose or with one or two thin branches, 4–20 mm high, slightly covered with 2- and 3-partite hairs, sometimes glabrescent, bearing 1–3(5) elliptic, ovate to broadly ovate, entire or slightly dentate leaves (with teeth more distinct than in rosette leaves), pubescent like the rosette leaves, often larger (particularly in width). Raceme 4–15-flowered, compact at flowering, elongating and diverging in fruit; pedicels thin, glabrous or slightly pubescent, rather abruptly diverging from axis in fruit; sepals oblong-ovate, with few simple hairs; petals yellowish 430 white (white when dry), obovate, notched or rounded at apex, ca. 5 mm long; silicles ovate-lanceolate, flattened, 8–15 mm long, 2–3 mm broad, ascending, shorter than or as long as pedicels, glabrous with simple hairs at margins of valves; style ca. 0.5 mm long. June–August.

Stony places. – Arctic: Arc. Sib. (Yakutia), An., Chuk.; Far East: Kamch. **Gen. distr.**: Ber. Described from Kamchatka. Type in Leningrad.

66. **D. hirta** L., Syst. nat. 10 ed. (1759) 1127 (p. pte.); Zetterstedt, Resa II (1822) 24, 44; Ldb., Fl. Ross. I (1842) 151 (partim); N. Busch in Fl. Sib. et Or. Extr. III (1919) 349; Pohle, Dr. asiat. (1925) 35; Schulz, Draba (1927) 267; Kryl., Fl. Zap. Sib. VI (1931) 1326. – D. glabella Pursh, Fl. Am. sept. II (1814) 424; Schulz, Draba (1927) 275; Fernald in Contr. Gray Herbarium CV (1934) 333. – D. daurica DC., Syst. (1821) 350; Schulz, Draba (1927) 274 (p. pte.); Kom., Fl. Kamch. II, 181; E. Ekm. in Sv. Bot. Tidscr. 24, 2 (1930) 280. – D. johannis Ldb., Fl. Ross. I (1842) 150. – D. gracilis Ldb., Fl. Ross. I (1842) 152. – D. magellanica E. Ekm. in Sv. Vet. Ak. Handl., 57, 3 (1917) 44. – D. hirta barea Ostf. in Dansk Vid.-Selsk. Med., VI, 3 (1926). – D. rupestris auct. plur. fl. Sib. (non R. Br.). – D. juvenilis Kom. in Fedde, Rep. XIII (1914) 163 (p. pte.). – D. katunica N. Busch in Bull. Ac. Sc. (1918) 1633; ej. in Fl. Sib. et Or. Extr. III (1919) 361. – Ic.: N. Busch, l. c. (1919) 351, 362 (sub D. katunica) et tab. geogr. 353 et 363; Schulz, l. c. (1927) 268; Fernald, l. c. (1934) pl. 307, 308.

Perennial, more or less loosely cespitose; rosette leaves oblong, somewhat dilated toward apex, subacute, with few but distinct slightly elongated, small teeth, the smaller leaves sometimes entire, 8–40(45) mm long, 1.5–8(12) mm broad, densely covered on both sides with short, stellate hairs, the smaller leaves gray-pubescent, the larger sparsely pubescent, bright green, all remotely ciliate (mostly toward base) with simple and furcate hairs; stems straight or slightly curved, 3.5–27 cm at flowering, to 35–40(50) cm high in fruit, with small, stellate, sometimes also simple and branched hairs, or glabrous, simple or (rarely) few-branched, bearing 1–6 leaves, very rarely leafless, leaves oblong-ovate or oblong-rhombic,

distinctly denticulate (rarely in poorly developed plants, entire or subentire), shorter than rosette leaves but about as broad or broader, pubescent like the rosette leaves. Raceme 4–36-flowered, rather compact at flowering, becoming loose during flowering, elongating in fruit; pedicels glabrous,
431 or with simple and furcate hairs; sepals ovate or oblong-ovate, glabrous or with few simple and furcate hairs; petals white, 4–5.5(7) mm long, obovate, hardly emarginate to more or less straight-truncate; silicles oblong-ovate or ovate-lanceolate, rarely oblong-ovate-elliptic, flattened, slightly curved or contorted, glabrous or with simple and furcate hairs, 7–14 mm long, 1.5–3–5 mm broad, slightly longer than pedicels, rarely slightly shorter; style ca. 0.5 mm long; seeds brown, rather large. June–August.

Clayey and sandy, often rocky grasslands in tundra, sometimes in stony places. In the forest zone, on rocks. – Arctic: Nov. Z., Arc. Eur., Arc. Sib., Chuk., An. ?; European part: Kar.-Lap., Dv.-Pech. (in Pechora River basin); W. Siberia: Irt. (Borovoe forest district in former Kokchetav County), Alt.; E. Siberia: Yenis., Lena-Kol., Ang.-Say. ? (doubtful specimen); Far East: Okh., Kamch.; Centr. Asia: Dzu.-Tarb. Gen. distr.: Arc., Scand., Mong., N. Am. Described from northern Scandinavia. Type in Geneva (Herb. DC. sec. O. E. Schulz).

Note. The varieties and forms of D. hirta represent individual variations of no real taxonomic significance. Also, the close species D. juvenilis Kom. and D. subamplexicaulis C. A. M. have sometimes been claimed to be "varieties" of D. hirta.

Series 19. **Lasiophyllae** Tolm. – Perennial, small, compact or loosely cespitose. Leaves and stems densely gray-pubescent with short, stellate and branched hairs. Rosette leaves oblong, dentate or entire; leaves of flowering stems 1–5, ovate, usually conspicuously denticulate. Flowers white, rather small, petals narrow. Silicles ovate, usually contorted, glabrous or with simple and furcate hairs, with a short style (0.5 mm).

67. **D. lasiophylla** Royle, Ill. Bot. Himal. Mts., I (1839) 71; Pohle, Dr. asiat. (1925) 72; Schulz, Draba (1927) 279. – D. altaica O. Fedtsch. in A. H. P. XXVIII, f. III (1909) 463 (p. pte.). – D. incana var. multicaulis Rgl. in sched.; O. Fedtsch. in A. H. P. XXI (1903) 268 (36). – D. stellata var. hebecarpa Rgl. in Bull.Soc.Nat.Mosc. XXXIV (1861) 193, sec. Pohle. – D. stellata var. brachycarpa Pohle in sched.

Perennial, small, compact or loosely cespitose. Rosette leaves oblong, 8–15 mm long, 2–4 mm broad, subacuminate or obtuse, entire or inconspicuously denticulate, densely covered on both sides with short, stellate and branched hairs, canescent, with stiff, simple cilia at margin toward base. Flowering stems erect or ascending, usually rather thick, with short, stellate and branched hairs, 4–26 cm high, bearing 1–5 small, ovate, sometimes
432 broadly ovate leaves, conspicuously denticulate, pubescent as rosette leaves. Raceme 5–23-flowered, compact at flowering, subcapitate, strongly elongating in fruit but remaining compact at summit; pedicels short, densely covered with short, stellate, branched, and simple hairs; sepals elliptic, with simple sometimes furcate hairs; petals white, oblong-obovate, 3–3.5 mm long, hardly emarginate to straight-truncate; silicles ovate, acuminate, thick,

often contorted, 5.5–10 mm long, 2.5–3 mm broad, glabrous or with simple and furcate hairs, markedly longer than pedicels; style thin, ca. 0.5 mm long; seeds rufous. (Plate XXV, Figure 4).

Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.**: Tib., Dzu.-Kash., Ind.-Him. (Himalayas). Described from the Western Himalayas.

Note. In Karelin's and Kirillov's collection there are plants marked "Altai." It is possible that they were collected in Central Asia (Dzungaria-Tarbagatai area), not in West Siberia (Altai).

Series 20. **Incanae** Tolm. – Perennial or biennial. Stems solitary or in small tufts, thick, erect, usually branching in the larger specimens, very leafy. Leaves (and, generally, entire plant) densely covered with simple, branched, or stellate hairs,, canescent, more or less crenate along margin, the radical relatively narrow, the cauline wider, oblong-ovate. Flowers white, rather small, petals narrow. Fruiting raceme elongating, often whiplike. Silicles elliptic-lanceolate, longer than pedicels, glabrous or pubescent, with short style.

1. Stems covered mostly with long, simple hairs . . . . 2.
+ Stems covered with short, branched hairs . . . . 3.
2. Cauline leaves often numerous, up to 50 in larger specimens, lower cauline leaves usually shorter but broader than rosette leaves; upper cauline leaves gradually and evenly reduced in dimensions; silicles glabrous or pubescent. Northern plants . . . . 71. **D. incana** L.
+ Cauline leaves less numerous (not more than 18), usually up to 10 even in large specimens; lower cauline leaves usually longer and broader than rosette leaves; upper cauline leaves somewhat smaller but only slightly changing in dimensions, sometimes nearly all leaves almost equal in size; silicles pubescent. Caucasian plants . . . . 70. **D. stylaris** I. Gay.
433 3. Fruiting raceme elongate, whiplike; silicles pubescent . . . . 69. **D. lanceolata** Royle.
+ Fruiting raceme more or less compact, not as above; siliques glabrous . . . . 68. **D. mongolica** Turcz.

68. **D. mongolica** Turcz., Fl. baic.-dahur. I (1842) 133, 138; N. Busch in Fl. Sib. et Or. Extr. III (1919) 374; Pohle, Dr. asiat. (1925) 76; Schulz, Draba (1927) 277. – D. hirta var. dasycarpa Maxim., Enum. pl. Mong. I (1889) 51 (p. pte.). – D. incana var. mongolica E. Rgl. in Bull. Soc. Nat. Mosc. XXXIV, 3 (1861) 197. – Ic.: N. Busch, l. c. (1919) 375 et tab. geogr. 376.

Biennial (sometimes perennial), small, cespitose; rosette leaves oblong, subacuminate, denticulate (the smaller sometimes entire), 8.18 mm [sic, should be 8–18] mm long, 1.5–4 mm broad, densely covered with short, stellate and branched hairs, canescent; stems erect, simple or branching, 5–6 cm high, densely covered with short, branched and stellate hairs (sometimes mixed with longer, simple hairs), bearing 3–6 oblong-ovate, subacuminate, denticulate leaves, canescent with short, branched and stellate hairs. Raceme 6–25-flowered, compact at flowering, elongating but rather compact in fruit; pedicels densely pubescent with branched, furcate, and simple hairs; sepals elliptic, simple-hairy; petals white, oblong-obovate, 2.5–3 mm long, rounded, straight or slightly notched at apex; silicles elliptic-lanceolate; erect or ascending; 6–7 mm long, 1.5–2 mm broad, longer than pedicels, glabrous; style ca. 0.2 mm long; seeds rufous. June–July.

E. Siberia: Dau.; Far East: Ze.-Bu. **Gen. distr.:** Mong., Tib. Described from Nukha-Daban peak near Kosogol Lake (northern Mongolia). Type in Leningrad.

Note. The record of D. mongolica from the coast of the Sea of Okhotsk obviously must refer to D. lanceolata Royle.

69. **D. lanceolata** Royle, Illustr. Bot. Himal. Mts. I (1839) 72; Schulz, Draba (1927) 296; Kryl., Fl. Zap. Sib. VI (1931) 1329; Fernald in Rhodora (1934) 357. – D. confusa DC., Syst. II (1821) 348 (p. pte.); Turcz., Fl. baic.-dahur. I (1842) 140. – D. hirta Ldb., Fl. Ross. I (1842) 755. – D. stylaris N. Busch in Fl. Sib. et Or. Extr. III (1919) 375 (non J. Gay!); Pohle, Dr. asiat. (1925) 52 (p. max. pte.). – D. cana Rydb. in Bull. Torr. Bot. Club XXIX (1902) 241; Schulz, l. c., 298. – D. pallida Goodding in Bot. Gaz. XXXVII (1904) 55; Schulz, l. c., 294. – D. magellanica ssp. cinerea Ekm. in sched. plant. alt. – Ic.: N. Busch, l. c. (1919) 378 et tab. geogr. 380; Fernald, l. c. (1934) pl. 316, 317, 318.

434 Perennial (seldom biennial), small, more or less compact, cespitose; rarely with solitary stems; rosette leaves oblong-lanceolate, 8–40 mm long, 1.5–6.5 mm broad, crenate or entire, subacuminate, canescent with short, thin, stellate and branched hairs, sometimes hairs at margin stiffer, simple and furcate; stems erect or ascending, simple or (often strongly) branching, thin or more or less thick, 6–40 cm high, densely covered with short, branched hairs, bearing rather numerous (4–18) oblong-ovate or ovate-lanceolate, subacuminate leaves, usually distinctly dentate, rarely subentire, slightly broader than rosette leaves, the lower leaves as long as or longer than the rosette leaves, the upper usually shorter but generally differing very little in size, pubescent as the rosette leaves. Raceme many-flowered (10–40), compact at flowering, whiplike-elongate; pedicels densely covered with branched and stellate hairs; sepals narrowly ovate, densely pubescent with thin, simple and branched hairs; petals white, oblong-obovate, straight-truncate to hardly emarginate, 2.5–4 mm long; silicles lanceolate, parallel to axis, rather thick, 6.5–11 mm long, 1.25–2 mm broad, 2–4 times as long as pedicels (rarely a little longer), densely pubescent with branched and stellate hairs; style rather thin, 0.4–0.8 mm long; seeds rufous. June–July.

Stony slopes and taluses and rocks. – W. Siberia: Alt.; E. Siberia: Yenis., Ang.-Say., Dau., Lena-Kol. (southern part); Far East: Okh., Uda., Uss. (northern Sikhote-Alin), Kamch. (Elovka River); Centr. Asia: Dzu.-Tarb., Pam.-Al. **Gen. distr.:** Ind.-Him. (Himalayas), Tib., Dzu.-Kash., N. Am. Described from the western Himalayas.

70. **D. stylaris** J. Gay ap. E. Thomas, Cat. pl. Suisse (1818) 13. – D. confusa DC., Syst. II (1821) 348 (p. pte.). – D. thomasii Koch, Syn. 2 ed., I (1843) 428. – D. incana prol. thomasii Arcang., Comp., Fl. Ital. 2 ed. (1894) 276; Schulz, Draba (1927) 286. – D. incana var. hebecarpa N. Busch in Fl. cauc. crit., III, 4 (1909) 411.

Biennial, sometimes perennial, with solitary or few stems; rosette leaves oblong-spatulate or oblong-obovate, tapering into a petiole, obtuse, with distinct, sometimes rather large teeth, rarely subentire, 5–45 mm long, 1.5–10 mm broad, densely covered with rather long, thin, simple, furcate, and branched hairs, sometimes ciliate toward base with stiffer, simple and furcate hairs; stems more or less thick, simple or branching, densely gray-pubescent with long, often interwoven simple hairs mixed with shorter branched ones, 6–54 cm high, bearing 6–18 oblong-ovate, slightly acuminate leaves, similar to rosette leaves in pubescence; lower leaves larger than
435 the rest, broader and often longer than rosette leaves, upper leaves just a little smaller, thus all leaves looking often nearly equal. Raceme many-flowered (8–55), compact at flowering, whiplike elongating in fruit (sometimes up to 28 cm); in branching plants, the main raceme always larger than the lateral; pedicels densely covered with thin, interwoven, simple hairs, subappressed to axis in fruit; sepals ovate, with thin, simple hairs; petals white, oblong-obovate, emarginate, 3.5–4 mm long; silicles lanceolate or elliptic-lanceolate, 7–12 mm long, 1.5–3 mm broad, 2–3 times as long as pedicels (the lower sometimes hardly as long), densely covered with simple and furcate hairs; style thick, short (0.2–0.5 mm); seeds small, grayish brown. May–July.

Caucasus: Cisc., Dag., E. Transc. (at Dagestan borders). **Gen. distr.:** Centr. Eur. Described from Switzerland.

Note. A hybrid, D. stylaris × siliquosa (f. microcarpa Trautv.), is well known. A form with thinner stems and smaller leaves may be regarded as var. ledebourii (Rouy et Fouc.) Schulz. The record of D. stylaris from Central Asia and Siberia is the result of misidentification of D. lanceolata Royle, which grows there.

71. **D. incana** L., Sp. pl. ed. 1 (1753) 643; Ldb., Fl. Ross. I (1842) 152; Schulz, Draba (1927) 282. – D. contorta Ehrh., Beitr. Naturk. VII (1792) 166; Ldb., Fl. Ross. I (1842) 152. – Ic.: Schulz, l. c. (1927) 268; Fernald in Rhodora (1934) pl. 299.

Biennial, sometimes perennial, with solitary or few stems; root branches sometimes bearing rosettes as well as stems; leaves rosetted at stem base (usually soon dying), oblong-spatulate or lanceolate, tapering toward base, obtuse or subacuminate, entire or few-denticulate, 7–25 mm long, 1.5–4 mm broad, covered with thin and rather long, simple and branched hairs, ciliate toward base with stiff, simple (sometimes furcate) hairs; stems thick, straight or twisted at upper part, simple or branching, densely gray-pubescent with long, simple, often interwoven hairs, sometimes mixed with smaller branched hairs, 1.5–35 cm high, bearing numerous leaves (8–50), leaves sessile, connivent, often almost continuously covering stem, oblong-ovate, broad at base, distinctly dentate, subacuminate, canescent with rather long, branched and simple hairs (more copious than on rosette leaves); lower leaves usually slightly shorter but broader than rosette leaves; upper leaves gradually and evenly reduced. Raceme many-flowered (10–40), compact at flowering, whiplike elongating in fruit; pedicels short, densely
436 covered with long, simple, furcate, and branched hairs, subappressed to axis in fruit; sepals oblong-elliptic, often pale, yellowish, pubescent with thin, simple and furcate hairs; petals white, spatulate, distinctly emarginate,

3.5–4.5 mm long; silicles lanceolate-elliptic, 6–13 mm long, 1.5–2.5 mm broad, flattened or slightly contorted, 2–5 times as long as pedicels, glabrous (var. *legitima* Lindbl.) or with simple and furcate hairs (var. *hebecarpa* Lindbl.); style thick, short (0.2–0.5 mm); seeds large, rufous. June–July.

Dry, mainly sandy places; often by roadsides. – Arctic: Arc. Eur.; European part: Kar.-Lap., Dv.-Pech. (shores of the White Sea). **Gen. distr.**: Arc. (south of Greenland), Scand., Atl. Eur. (north of Great Britain and Ireland), N. Am. (Atlantic coast). Described from northern Europe. Type in London.

Series 21. **Cardaminiflorae** Tolm. – Perennial, forming loose tufts. Leaves oblong-spatulate, densely gray-pubescent with short, stellate hairs. Flowering stems leafless or bearing up to 8 leaves, stellate-hairy, sometimes glabrous in upper part. Flowers white, large (petals 4–7 mm long), petals rounded. Silicles oblong-elliptic, flattened (seldom slightly contorted), with long style (1–2 mm), glabrous or short-stellate.

1. Flowering stems pubescent throughout, bearing 4–8 leaves; petals 6.5–7 mm long; silicles pubescent . . . . 72. **D. cardaminiflora** Kom.

+ Scapes slightly pubescent only in lower part, leafless or bearing one or two leaves; petals 4–6 mm long, silicles glabrous . . . . 73. **D. ussuriensis** Pohle.

72. **D. cardaminiflora** Kom. in Bull. Jard. Bot. Petr. XVI, 1 (1916) 169; N. Busch in Fl. Sib. et Or. Extr. III (1919) 370. – D. *sachalinensis* f. *stellatopilosa* Pohle, Dr. asiat. (1925) 132. – D. *sachalinensis* var. *cardaminiflora* Schulz, Draba (1927) 281. – Ic.: N. Busch, l. c., 371, 372 et tab. geogr. 369.

Perennial, large, loosely cespitose; rosette leaves oblong-spatulate, tapering into a petiole, obtuse, entire or inconspicuously few-denticulate, 10–25 mm long, 2–5 mm broad, densely gray-pubescent with short, stellate hairs; dead rosettes often persist on branches, slightly distant from the live rosettes due to the rapid growth of these branches; flowering stems more or less erect, 8–25 cm high, rather thick, covered with short, stellate and branched hairs, bearing 4–8 oblong leaves (the lower larger, oblong-obovate, 437 the upper shorter, narrowly oval), few-toothed at margin, densely pubescent. Raceme 12–25-flowered, corymbose at flowering, loose, markedly elongating in fruit; pedicels thin, long, densely covered with short, branched hairs, ascending in fruit; sepals narrowly ovate, pubescent with short branched hairs; petals white, broadly obovate, rounded, 6.5–7 mm long; silicles oblong-elliptic, 8–12 mm long, 2.5–3.25 mm broad, shorter than or as long as pedicels, pubescent with short branched hairs; style thin, long (1.5–2 mm); seeds rufous, large. June. (Plate XXV, Figure 5).

Rocks. – Far East: Uss. Endemic. Described from the Tyutikhe River and Plastun Inlet. Type in Leningrad.

73. **D. ussuriensis** Pohle in Bull. Jard. Bot. Petr. XIV (1914) 470; ej., Dr. asiat. (1925) 33; N. Busch in Fl. Sib. et Or. Extr. III (1919) 372; Schulz, Draba (1927) 189. — Ic.: N. Busch, l. c., 373 et tab. geogr. 369.

Perennial, more or less loosely cespitose; leaves oblong-spatulate, tapering into a petiole, obtuse or subacuminate, with small, broad teeth or entire, 7—14 mm long, 2—4 mm broad, densely gray-pubescent with short, stellate hairs; stems thin, 2.5—14 cm high, leafless or bearing one or two small, oblong-ovate, densely pubescent leaves, usually small-toothed, sparingly covered in lower part with short, stellate hairs, glabrous in upper part. Raceme 7—17-flowered, always rather loose, spreading, moderately elongating in fruit; pedicels thin, glabrous, almost perpendicular to axis in fruit; sepals ovate, covered with short, simple hairs; petals white (yellowish white ?), obovate, rounded, 4—6 mm long; silicles oblong-ovate, subacuminate, 5—10 mm long, 2—2.5 mm broad, shorter than or as long as pedicels, flattened or (rarely) slightly contorted, glabrous; style thin, ca. 1 mm long; seeds rufous. June—July.

Marine cliffs. — Far East: Uss., Uda. **Gen. distr.**: Jap.-Ch. (southern Sakhalin ? Manchurian coast). Described from shores of Tatar Strait. Type in Leningrad.

Series 22. **Boreales** Pohle (ex pte.). — Perennial, forming loose tufts. Rosette leaves broad, obovate or oblong-obovate, usually obtuse, denticulate or entire, covered with simple, furcate, branched, and stellate hairs. Flowering stems mostly with long, simple hairs, bearing few (rarely one) more or less broad, usually large-toothed leaves. Flowers white, large 438 (petals 4—8 mm long). Silicles lanceolate to suborbicular, with distinct styles (0.5—2 mm long), usually contorted, glabrous or pubescent with short, simple and furcate hairs.

1. Leaves covered mostly with short, branched and stellate hairs; silicles broadly elliptic or suborbicular . . . . 74. **D. kurilensis** (Turcz.) F. Schmidt.

+ Leaves covered mostly with stiff, simple and furcate hairs; silicles narrower . . . . 2.

2. Petals 6—8 mm long; raceme corymbose at flowering, spreading in fruit; silicles with long style (1—2 mm) . . . . 75. **D. sachalinensis** F.Schmidt.

+ Petals 4—5.5 mm long; raceme subcapitate at flowering, elongating in fruit, not spreading, silicles with short style (ca. 0.5 mm) . . . . 76. **D. borealis** DC.

74. **D. kurilensis** (Turcz.) F. Schmidt in Mém. Ac. Sc. 7 sér., XII, 2 (1868) 218; N. Busch in Fl. Sib. et Or. Extr. III (1919) 366; Pohle, Dr. asiat. (1925) 30; Schulz, Draba (1927) 281. — Odontocyclus kurilensis Turcz. in Bull. Soc. Nat. Mosc. (1840) No. 1, 65; Ldb., Fl. Ross. I (1842) 765. — D. borealis var. kurilensis F. Schmidt, l. c., 114. — Ic.: N. Busch, l. c. (1919) 366 et tab. geogr. 367.

Perennial, loosely cespitose; rosette leaves obovate, rounded-subobtuse, sharply tapering into a petiole, entire or few-toothed, 10–25 mm long, 4–8 mm broad, densely covered with short, branched and stellate and some simple hairs; flowering stems ascending, 7–18 cm high, rather thick, with long, thin, simple and shorter, branched hairs, bearing 2–7 oval or broadly ovate, subacuminate, large-toothed leaves pubescent like rosette leaves but with more simple hairs. Raceme 12–25-flowered, rather compact at flowering, strongly elongating in fruit, narrow; pedicels with thin, simple (some branched) hairs, ascending in fruit; sepals ovate or oblong-ovate, simple-hairy; petals obovate, white, 4–6.5 mm long; silicles broadly elliptic or suborbicular, slightly contorted, 3.5–7 mm long, 2.2–5 mm broad, as long as pedicels or shorter (rarely longer), glabrous or shortly simple-pubescent; style 0.5–0.75 mm long; seeds large, rufous. Type in Leningrad.

Far East: Sakh. **Gen. distr.**: Jap.-Ch. (Kurile Islands, Hokkaido Island). Described from the Kurile Islands.

75. **D. sachalinensis** F. Schmidt in Mém. Ac. Sc. Pétersb., 7 sér., XII, 2 (1868) 218; N. Busch in Fl. Sib. et Or. Extr. III (1919) 368; Pohle, Dr. asiat.
439 (1925) 31; Schulz, Draba (1927) 281. – D. borealis var. sachalinensis F. Schmidt, l. c., 144. – Ic.: N. Busch, l. c., 368 et tab. geogr. 369.

Perennial, loosely cespitose; rosette leaves oblong-obovate or obovate, obtuse or subacuminate, small-toothed, rarely entire, 10–45 mm long, 3–17 mm broad, densely covered with stiff, simple and furcate, often partly short and thin, branched hairs; stems ascending, rather thick, with stiff, simple, often retrorse hairs and short, appressed, furcate and branched ones, 9–30 mm high, bearing 1–3 oblong-ovate or ovate, subacuminate leaves, distinctly and rather large-toothed, smaller than rosette leaves, sparingly hairy (with same hairs as the rosette leaves). Raceme 12–30-flowered, short but rather loose, corymbose at flowering, strongly elongating, spreading in fruit; pedicels long, with spreading, simple hairs, fruiting pedicels spreading to ascending, sepals ovate, saccate, simple-hairy; petals white, obovate, 6–8 mm long, slightly emarginate, silicles lanceolate, often falcately curved, contorted, rarely flattened; usually ascending, 8–15 mm long, 1.5–3.5 mm broad, shorter than pedicels, glabrous or with short, simple and furcate hairs; style thin, 1–2 mm long; seeds rufous, large. June. (Plate XXV, Figure 6).

Far East: Sakh. **Gen. distr.**: Jap.-Ch. (southern Sakhalin, Hokkaido). Described from Sakhalin. Type in Leningrad.

76. **D. borealis** DC., Syst. 2 (1821) 342; Ldb., Fl. Ross. I (1842) 153; N. Busch in Fl. Sib. et Or. Extr. III (1919) 365; Pohle, Dr. asiat. (1925) 27; Schulz, Draba (1927) 280; Kom., Fl. Kamch., II (1929) 182. – D. unalaschkiana DC., l. c. (1821) 350; Ldb., Fl. Ross. I (1842) 153. – D. rupestris Cham. et Schl. in Linnaea I (1826) 23 (p. pte.). – D. incana prima species Cham. et Schl., l. c. (1826) 23. – D. incana Don, Gen. syst. garden and bot. I (1831) 185 (sec. Pohle). – D. incana var. borealis Torr. et Gray, Fl. N. Amer. I (1838–1840) 107. – D. hirsuta Turcz. in Bull. Soc. Nat. Mosc. I (1840) 61. – Schivereckia contorta Andrz. in sched. herb. Ldb.; Ldb., Fl. Ross. I (1842) 211. – D. hirta f. subamplexicaulis Kjellm. in Vega-Exp. Vetensk. Jakut. I (1882) 540. – D. incana var. contorta Trautv. in A. H. P. IX, 2 (1886) 472. – D. spiralis Eschsch. in sched. – Ic.: N. Busch, l. c. (1919) 364 et tab. geogr. 365.

Perennial, more or less loosely cespitose; rosette leaves broad, obovate or oblong-obovate, 10–30(50) mm long, 3–12(16) mm broad, more or less tapering into a petiole, subacuminate or obtuse, with few but sometimes rather large, sometimes smaller, teeth at margin, sometimes entire, more or less densely and evenly covered with stiff, simple and thinner, furcate
440 and branched hairs, with stiff, simple and furcate cilia at margin, rarely (older, large leaves) glabrescent on surfaces; stems ascending, densely covered with stiff, spreading sometimes slightly declinate, simple hairs, sometimes sparsely mixed with smaller, branched hairs, 4.5–22 cm high, simple or one or two branched, bearing 2–7(1–10) broadly elliptic or broadly ovate, rarely oblong-ovate or spatulate leaves distinctly few-denticulate (the smaller sometimes entire), often broader and sometimes generally larger than rosette leaves but of the same pubescence. Raceme 8–18-flowered, compact at flowering, subcapitate, strongly elongating in fruit; pedicels densely covered with spreading hairs; sepals oblong-elliptic, more or less densely covered with fine, simple hairs; petals white, oblong-obovate, straight or emarginate, 4–5.5 mm long; silicles oblong-ovate or oblong-elliptic, 8–12 mm long, 2.5–3.5 mm broad, flattened or contorted, more or less densely covered with simple and furcate hairs, sometimes glabrous; style ca. 0.5 mm long. June–July.

Arctic: Chuk.; Far East: Kamch., Okh., Sakh. **Gen. distr.**: Ber., Jap.-Ch. (Kurile Islands). Described from Saint Paul Island (Bering Sea). Type in Geneva.

Series 23. **Hyperboreae Gilg.** – Perennial, forming small shrubs. Leaves large, radical 2.5–10 cm long and 0.5–2.5 cm broad, large-toothed, pubescent with short, branched and stellate hairs. Stems relatively low, hardly exceeding radical leaves, bearing 5–10 leaves, pubescent. Raceme broad, spreading. Flowers yellowish white, petals narrow. Silicles large, elliptic, glabrous, with distinct style.

77. **D. hyperborea** (L.), Desv., Journ. Bot. III (1814) 172; Schulz, Draba (1927) 198. – Alyssum hyperboreum L., Sp. pl. (1753) 651; Ldb., Fl. Ross. I (1842) 139. – D. grandis Langsd. ap. DC., Syst. II (1821) 355; N. Busch in Fl. Sib. et Or. Extr. III (1919) 300; Pohle, Dr. asiat. (1925) 24. – Cochlearia spathulata Schlecht. ap. DC., l. c. (1821) 369; Ldb., l. c., 158. – D. spathulata Spreng., Syst. veg. II (1825) 876. – Nesodraba grandis Greene in Pittonia III (1897) 253. – Ic.: N. Busch, l. c., 301; Schulz, l. c., 199.

Perennial, forming small tufts, with thick main root; radical leaves large, flat, oblong-obovate, tapering into a long, broad, often white petiole, subacuminate, with large, angular teeth in upper part, 2.5–10 cm long, 0.5–2.5 cm broad, covered with short, branched and furcate hairs; stems thickened in lower part, bearing leaves similar to the radical ones, upper part also thick, ascending or bent and nearly prostrate at base then later
441 ascending, 5–17 cm high, bearing (in addition to the large leaves at base) 4–8 relatively small, oblong, subacuminate-denticulate leaves, covered with short, branched hairs. Raceme 10–20-flowered, spreading, corymbose,

slightly elongating in fruit but very broad; pedicels long, the upper fruiting pedicels ascending, the rest spreading from axis, densely pubescent with branched, furcate, and simple hairs; petals yellowish white or pale yellow, oblong-obovate or spatulate, hardly emarginate or straight-truncate, 4–5 mm long; silicles elliptic or broadly elliptic or ovate-elliptic, obtuse, 8–14 mm long, 4.5–7 mm broad, shorter than pedicels, glabrous; style 0.5–1 mm long; seeds dark grayish brown.

Far East: Okh. (Okhotsk, collected by Kruze), Kamch. (Petropavlovsk, Mertens). **Gen. distr.**: Ber. (Pribilof and Aleutian Islands). Described from America. Type in London.

Note. Both records for the Soviet flora are questionable, since no one has found D. hyperborea in the locality indicated or in other places in the same area (see Kom., Fl. Kamch. II (1929) 186).

Series 24. **Hispidae** Tolm. — Perennial, loosely cespitose; leaves flat, obovate, rather large-dentate, covered with short, furcate hairs. Flowering stems leafless. Raceme many-flowered, strongly elongating in fruit. Flowers yellow, rather large. Silicles oblong-elliptic, glabrous; pedicels long, abruptly recurved from axis. Style very short.

78. **D. hispida** Willd., Spec. plant. III, 1 (1800) 426; N. Busch in Fl. cauc. crit. III, 4 (1909) 424; Schulz, Draba (1927) 77. — D. tridentata DC., Syst. II (1821) 340; Ldb., Fl. Ross. I (1842) 148; Boiss., Fl. Or. I (1867) 300. — D. rupestris Willd. ex DC., l. c. (non R. Br.). — D. hispida var. tridentata O, Ktze. in A. H. P., X, 1 (1887) 166. — D. pallidiflora Rupr. in sched. herb. Ac. Sc.

Perennial, loosely cespitose; leaves obovate, tapering into a rather broad petiole, more or less obtuse or subacuminate, with 1–3 (rarely up to 7) usually rather large teeth (the smallest sometimes entire), 1(0.5)–3.5 cm long, 3(1.5)–12 mm broad, more or less evenly covered at margin and on both sides with short, furcate hairs, sometimes glabrescent. Flowering stems leafless, numerous in the larger plants, 2.5–14 cm at flowering, up to 28 cm high in fruit, often slightly twisted, glabrous. Raceme 5–50-flowered, dense subanthesis, later becoming rather loose, gradually elongating, strongly elongating (up to 17 cm) in fruit; pedicels thin, glabrous, abruptly recurved from axis in fruit; sepals oblong-ovate, glabrous or
442 covered toward apex with very short hairs, pale; petals oblong-obovate, deeply incised at apex, yellow, 4.5–6 mm long; silicles oblong-elliptic, subobtuse, 6–13 mm long, 1.5–2.5 mm broad, shorter than or as long as pedicels, glabrous; style short (0.1–0.3 mm); seeds small, rufous. June–August. (Plate XXVI, Figure 4).

Taluses, moraines, alpine and subalpine meadows, 2,000–3,400 m; in some places in the forest zone descending to 1,400 m. — Caucasus: Cisc., W. and S. Transc. **Gen. distr.**: As. Min., Arm.-Kurd. Described from the Caucasus. Type in Berlin.

Note. Var. stenocarpa (Trautv.), N. Busch, l. c., 428 differs from the type by its long (15–16 mm) and narrow (1.5 mm) silicles.

Series 25. **Subsecundae** Tolm. — Perennial, forming small, loose tufts. Rosette leaves oblong-obovate or broader, tapering into a petiole, shortly ciliate at margin, glabrous on both sides. Flowering stems erect, glabrous, bearing two or three small leaves. Raceme loose. Flowers white. Silicles long, linear-lanceolate or linear, glabrous. Style short.

1. Rosette leaves suborbicular, tapering into a long (more than half as long as leaves) and narrow (not more than 1 mm broad) petiole; stems 12–19 cm high in fruit; silicles more than 20 mm long, subobtuse . . . . 79. **D. magna** (N. Busch) Tolm.

+ Rosette leaves mostly oblong-obovate, tapering into a short, relatively broad petiole; stems 4.5–9 cm high in fruit; silicles less than 20 mm long, subacuminate . . . . 80. **D. subsecunda** Somm. et Lev.

79. **D. magna** (N. Busch), Tolm. comb. n. – D. subsecunda var. magna N. Busch in Fl. cauc. crit. III, 4 (1909) 420; Schulz, Draba (1927) 267.

Perennial, small, loosely cespitose; rosette leaves spatulate, broadly obovate or suborbicular, rounded-obtuse or slightly subacuminate, obtusely few-denticulate or entire, 10–45 mm long, 4–9 mm broad, with long narrow petiole (up to 30 mm), not more than 1 mm broad, with few short, simple and 2-partite cilia at margin, glabrous at both sides; flowering stems slender, erect, glabrous, 7–8.5 cm at flowering, 12–19 cm high in fruit, bearing two or three small, ovate, sessile leaves. Raceme 4–7-flowered, always loose, elongating in fruit, diverging, often with silicles declinate to one side; pedicels thin, glabrous; sepals elliptic, brownish, glabrous; petals white, obovate, rounded, 5.5–6.5 mm long; silicles linear, 25–33 mm long, 1.5–2.5 mm broad, often half-drooping, sometimes somewhat twisted, obtuse, 443 glabrous; style short (0.25–0.5 mm). July. (Plate XXVI, Figure 3).

Rocks, moraines, and alpine meadows, 2,000–2,700 m. – Caucasus: Cisc. (Caucasian nature reserve), W. Transc. (Abkhazia). Endemic. Described from Abkhazia. Type in Leningrad.

Note. The differences between D. magna and D. subsecunda (partly in shape of leaves and in general dimensions of plant) are constant and sufficient to regard the former as an independent species.

80. **D. subsecunda** Somm. et Lev. in A. H. P. XIII, 1 (1893) 35; N. Busch in Fl. cauc. crit. III, 4 (1909) 419; Schulz, Draba (1927) 267. – Ic.: Somm. et Lev., l. c., tab. XII.

Perennial, loosely cespitose; rosette leaves oblong-obovate or obovate-lanceolate, gradually tapering into a petiole, subacuminate or obtuse, with few simple cilia at margin, glabrous on both sides, 4–8 mm long, 1.25–2 mm broad; stems thin, erect, 4.5–9 cm high in fruit; bearing two or three small, obovate, sessile leaves, glabrous. Raceme 4–10-flowered, spreading in fruit; pedicels thin, ascending or spreading, glabrous; silicles linear-lanceolate, subacuminate, sometimes slightly curved, 10–18 mm long, 1.25–1.75 mm broad, longer than the pedicels, glabrous; style ca. 0.5 mm long; seeds rufous.

Rocks and stony places. – Caucasus: Cisc. (Teberda River valley), W. Transc. Endemic. Described from the Teberda River. Type in Leningrad.

Series 26. **Repentes** Tolm. — Perennial, with long, prostrate stems, often terminating in long, evenly leaved shoots. Flowering stems usually arising laterally from shoots, leafless or with one or two leaves. Flowers yellow. Silicles ovate, oblong-elliptic, or linear-lanceolate, glabrous or slightly pubescent; style rather short (0.5–1 mm long).

1. Hairs straight, appressed; leaves linear-lanceolate; flowering stems with one or two narrow leaves; silicles linear-lanceolate, 10–15 mm long . . . . 82. **D. elisabethae** N. Busch.

+ Hairs branched, sometimes mixed with simple ones; leaves broader; flowering stems leafless or with 1–3 broad leaves below; silicles 4–8.5 mm long . . . . 2.

2. Leaves obtuse, oblong-obovate, densely pubescent; flowering stems low (1–5.5 cm high), together with pedicels pubescent throughout . . . . 81. **D. incompta** Stev.

+ Leaves subacuminate, sparsely pubescent; flowering stems at flowering 2.5–20 cm high, in fruit up to 25 cm, pubescent in lower part, glabrous above . . . . 83. **D. sibirica** (Pall.) Thell.

444 81. **D. incompta** Stev. in Mém. Soc. Nat. Mosc. III (1812) 268; Schulz, Draba (1927) 130. — D. incompta M. B., Fl. taur.-cauc. III (1819) 427; Ldb., Fl. Ross. I (1842) 148 (excl. pl. ararat.); N. Busch in Fl. cauc. crit. III, 4 (1909) 428. — D. glacialis var. incompta Rgl. in Bull. Soc. Nat. Mosc., XXXIV, 1 (1861) 186.

Perennial, small, very loosely cespitose; stems thin, prostrate to ascending, often sprouting rather long, leafy, sterile shoots; leaves oblong-obovate, tapering into a short petiole, obtuse, entire, 4–8 mm long, 1.5–3.5 mm broad, densely covered with thin, branched hairs, sometimes with few, stiffer, simple cilia at margin; flowering stems thin, ascending, often arising from the side of shoots, 1–5.5 cm high, leafless or bearing 1–3 broad leaves in lower part (similar to rosette leaves), together with pedicels covered with thin, branched hairs. Raceme loose, 2–10-flowered, spreading in fruit, often elongating; pedicels thin, long; sepals oblong-elliptic, pale, densely covered with short, branched hairs; petals oblong-obovate, emarginate or straight-truncate, 3.5–5 mm long, yellow (dry petals nearly white); silicles ovate or oblong-elliptic, 5–7 mm long, about as long as pedicels, glabrescent when ripe, with few, very short hairs only at margins; style ca. 0.5 mm long. July.

Rocks, 2,000–3,000 m. — Caucasus: Cisc., Dag., E. Transc. Endemic. Described from the Karachaev Region. Type in Helsingfors.

Note. Two varieties, var. macrocarpa Rupr. (silicles longer, lanceolate) and var. ruprechtii N. Busch (silicles more pubescent), have been described.

82. **D. elisabethae** N. Busch in Fl. cauc. crit. III, 4 (1909) 422.

Perennial; stems strongly branching, branches prostrate, forming loose tufts, more or less evenly leafy in upper part, sprouting short, prostrate, sterile shoots; leaves linear-lanceolate, subacuminate, entire or few-toothed, bilaterally covered with straight, appressed hairs, 6–10 mm long, 1–1.5 mm broad; flowering stems arising from side of shoots, ascending, twisting,

bearing two (rarely one) narrowly lanceolate, entire leaves, glabrous, or dispersely and appressedly hairy, 7–10 cm high in fruit. Raceme 4–8-flowered, loose, elongating in fruit; pedicels glabrous; silicles long, linear-
445 lanceolate, often slightly twisted, 10–15 mm long, 1.25–1.5 mm broad, 1.5–2 times as long as pedicels, glabrous; style thin, 0.5–1 mm long.

Rocks, 2,700–3,000 m. – Caucasus: Cisc. Described from the northern Caucasus (Karachai and Balkariya). Type in Leningrad.

Note. According to Schulz (Draba (1927) 81), different plants, some of them similar to D. sibirica (Pall.) Thell. with particularly leafless stems, were initially described under the name D. elisabethae. Shul'ts reported them under the name D. sibirica var. elisabethae (N. Busch) Schulz. Those plants preserved at the Herbarium of the Academy of Sciences of the USSR (Leningrad), indisputably represent an independent species.

83. **D. sibirica** (Pall.), Thellung, Gatt. Lepidium (1906) 318 in nota 2; Schulz, Draba (1927) 79; Kryl., Fl. Zap. Sib. VI, 1322. – Lepidium sibiricum Pall., Reise III (1776) 34. – Draba repens M. B., Fl. taur.-cauc. II (1808) 93; Ldb., Fl. Ross. I (1842) 147; Turcz., Fl. baic.-dahur. I (1842) 131; N. Busch in Fl. cauc. crit. III, 4 (1909) 422; Pohle, Dr. asiat. (1925) 145. – D. gmelini Adams in Mém. Soc. Nat. Mosc. V (1817) 107; N. Busch in Fl. Sib. et Or. Extr. III (1919) 319. – D. cretacea Czern. in Bull. Soc. Nat. Mosc., XXXVII (1865) 1, 177 (nomen nudum). – Ic.: N. Busch, l. c. (1919) 322 et tab. geogr. 324.

Perennial; stems thin, prostrate, branching, the branches elongating, evenly leafy in upper part, sprouting long, prostrate shoots; leaves ovate, oblong-ovate, or oblong-lanceolate, entire, acutish, tapering at base [more developed], 7–25 mm long, 2–10 mm broad, slightly or moderately covered with tightly appressed 2–3–4-branched hairs, sometimes glabrescent; flowering stems arising from sides of shoots, ascending, thin, leafless, 2.5–20 cm at flowering, up to 25 cm high in fruit, sparingly simple-hairy in lower part but generally glabrous. Raceme 6–20(3–35)-flowered, rather compact and capitate at flowering, strongly elongating in fruit; pedicels thin, abruptly declinate from axis, glabrous; sepals ovate, glabrous or with few simple hairs; petals dark yellow, oblong-obovate, slightly emarginate, 3.5–6.5 mm long; silicles ovate-lanceolate or oblong-elliptic, glabrous, subacuminate, 4–8.5 mm long, slightly or distinctly (sometimes two or three times) shorter than the pedicels; style thin, up to 1 mm long. April–August.

Alpine and subalpine meadows, clearings in forests, meadows, and plowed fields, and dry tundra. – Arctic: Arc. Eur. (east of the Pechora River), Nov. Z. (Novaya Zemlya south), Arc. Sib. (western part); European part: Lad.-Ilm., (near Luga), Dv.-Pech. (Pechora basin), U. V., V.-Kama (Urals area), U. Dnp., V.-Don; Caucasus: Cisc., W. and E. Transc. (rarely); W. Siberia: U. Tob.
446 (western parts), Ob (western parts and easternmost part), Irt. (easternmost part), Alt.; E. Siberia: Yenis., Ang.-Say., Dau., Lena-Kol.; Far East: Okh.; Centr. Asia: Dzu.-Tarb., T. Sh. **Gen. distr.**: Arc. (one locality in eastern Greenland), Mong., Dzu.-Kash. Described from Siberia.

Note. The differences between plants in various parts of the disruptive distribution of D. sibirica are not constant enough to subdivide it into races or small "species." In particular, there are no grounds to differentiate the Caucasian form D. repens M. B. from the plants in other parts of the area of D. sibirica s. str. (D. gmelini Ad.). The main variability of D. sibirica is apparently caused by the various conditions under which it grows. The Siberian plants are subdivided by N. A. Bush (Busch) into two basic types: var. genuina and var. latifolia N. Busch. In addition, var. caespitosa Pohle is described from Altai and is distinguished by its reduced shoots.

Series 27. **Eriopodae** Tolm. — Annual or biennial, with solitary or a tuft of few stems arising from a common root. Stems more or less erect, leafy, pubescent. Leaves covered with branched, furcate, and simple hairs, the radical ones soon dying, oblong-spatulate, the cauline oblong-ovate, acutish, dentate. Flowers pale yellow or nearly white, small, with narrow petals. Fruiting raceme elongating. Silicles ovate or elliptic, glabrous or simple-hairy; style rudimentary.

1. Petals 2.5—3.5 mm long; silicles ovate, glabrous, upright . . . . 84. **D. eriopoda** Turcz.
+ Petals ca. 2 mm long; silicles elliptic, ascending or spreading . . . . 85. **D. huetii** Boiss.

84. **D. eriopoda** Turcz. in Bull. Soc. Nat. Mosc. (1838) No. 146 (nomen); ej. Fl. baic.-dahur. I (1842) 142 (descr.); Ldb., Fl. Ross. I (1842) 154; N. Busch in Fl. Sib. et Or. Extr. III (1919) 385; Pohle, Dr. asiat. (1925) 17; Schulz, Draba (1927) 323; Kryl., Fl. Zap. Sib. VI (1931) 1331. — Ic.: N. Busch, l. c. (1919) 385.

Annual or biennial; stems solitary, rarely few growing from common root, rather sturdy, erect, simple or with few ascending branches, pubescent with long, divergent, simple hairs and smaller furcate and branched ones, 7—26 cm high, bearing 5—12 leaves. Radical leaves soon dying, oblong-spatulate, subacuminate, 7—20 mm long, 1.5—5 mm broad, the cauline leaves oblong-ovate, acutish, denticulate, lower leaves long, the upper short (thus 449 looking relatively broader), all densely covered with rather short, furcate and branched hairs and longer, simple ones. Raceme many-flowered (6—45), compact at flowering, strongly elongating in fruit, not spreading; pedicels more or less densely covered with simple, furcate, and branched hairs, ascending in fruit; sepals elliptic, pale, covered with simple, sometimes also furcate hairs; petals pale yellow or whitish, oblong-obovate, slightly emarginate, 2.5—3.5 mm long; silicles ovate or oblong-ovate, 5—8 mm long, 2—2.5 mm broad, flattened, glabrous, nearly parallel to axis but not appressed to it owing to the obliquely divergent pedicels, about as long as pedicels (the lower usually slightly shorter, the upper somewhat longer); style rudimentary; seeds large, rufous. June—July.

Gravels on riverbanks of the alpine zone. — W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau. **Gen. distr.**: Mong., Dzu.-Kash., Tib. Described from Transbaikalia. Type in Leningrad.

85. **D. huetii** Boiss., Diagn. pl. nov., 2 sér., V (1856) 31; ej., Fl. Orient. I (1867) 302; N. Busch in Fl. cauc. crit. III, 4 (1909) 405; Schulz, Draba (1927)

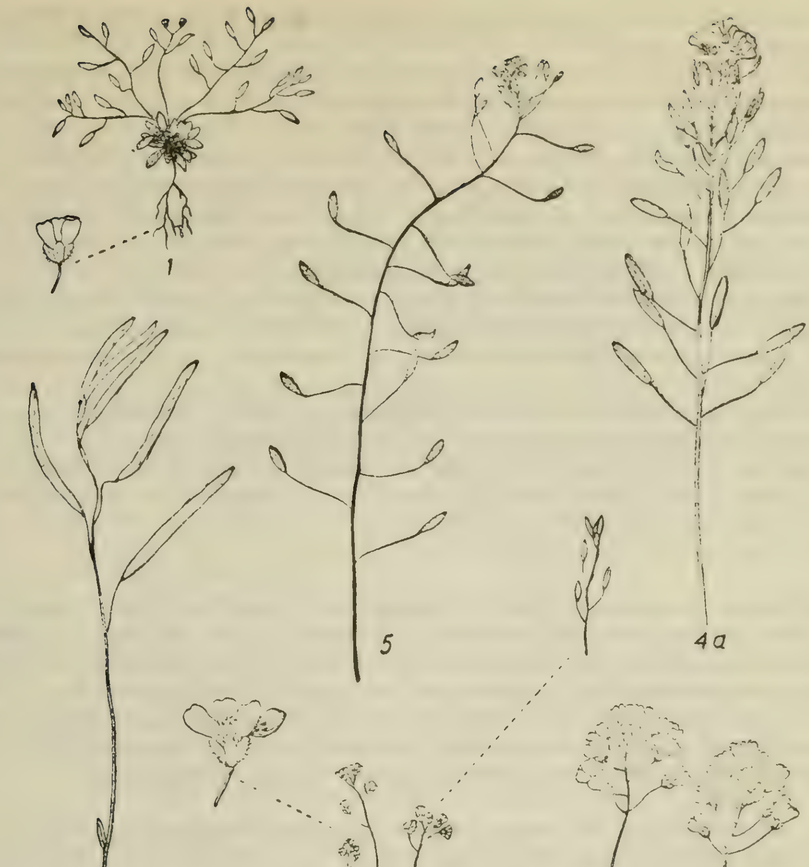

PLATE XXVI. 1 – Draba alticola Kom., and flowers; 2 – D. melanopus Kom., flowers and fruit; 3 – D. magna (N. Busch) Tolm., with fruit; 4 – D. hispida Willd., with flowers; 4a – D. hispida Willd., raceme with flowers and fruit; 5 – D. nemorosa L., raceme with flowers and fruit.

322. – D. lutescens f. huetiana Thell., Fl. adv. Montpell. (1912) 280. – Ic.: Schulz, l. c., 322.

Annual; stem erect, 4–17 cm high, simple, rarely with few ascending branches, bearing 4–12 leaves crowded below, densely covered with long, simple hairs and short furcate and branched ones. Leaves densely covered with simple, furcate, and branched hairs, radical leaves soon dying, obovate, obtuse, subentire, cauline leaves oblong-ovate, acutish, distinctly denticulate, 6–20 mm long, 2–8 mm broad, the lower always larger than the upper. Raceme many-flowered (10–50), compact subanthesis, then gradually elongating, strongly elongating in fruit, more or less spreading; pedicels covered with short, branched and partly simple hairs, ascending or spreading in fruit; sepals elliptic, with short, simple hairs; petals oblong-obovate, yellowish white, ca. 2 mm long, slightly emarginate; silicles elliptic, 6–10 mm long, 2–3 mm broad, as long as or longer than the pedicels, young silicles covered throughout with short, simple hairs, the mature ones hairy only at margins; style rudimentary. May.

Steppical slopes, stony areas, and as a weed. – Caucasus: S. Transc.; Centr. Asia: T. Sh. **Gen. distr.**: As. Min., Arm.-Kurd. Described from Turkish Armenia. Type in Geneva.

450 Series 28. **Nemorosae** Tolm. – Annual, with weak, thin root. Stems leafy, very rarely leafless, pubescent. Leaves dentate, the cauline more or less broad, usually ovate, radical leaves obovate or oblong-obovate, soon dying. Raceme loose, many-flowered, very strongly elongating and spreading in fruit. Pedicels very thin, long, glabrous or sparingly pubescent. Flowers small, pale yellow or white; petals narrow. Silicles oblong-elliptic or linear, glabrous or simple-hairy. Style rudimentary.

1. Stem covered with long, simple (sometimes furcate) hairs; petals 3.5–4.5 mm long, pale yellow . . . . 86. **D. stenocarpa** Hook. f. et Thoms.
+ Stem covered with furcate and branched (sometimes mixed with simple) or stellate hairs; petals not more than 3 mm long . . . . 2.
2. Leaves not amplexicaul, covered with branched and furcate, rather long hairs; petals 2–3 mm long, pale yellow . . . . 87. **D. nemorosa** L.
+ Leaves amplexicaul, covered with minute stellate hairs; petals 1.25–2 mm long, white . . . . 88. **D. muralis** L.

86. **D. stenocarpa** Hook. f. et Thoms. in Journ. Proc. Linn. Soc. Bot. V (1861) 153; Pohle, Dr. asiat. (1925) 11. – D. media Litw. in Trav. Mus. Bot. Ac. Sc. I (1902) 12. – D. stenocarpa var. media Schulz, Draba (1927) 318.

Annual; stem erect, usually rather sturdy, simple or branching, 3–40 cm high, more or less densely covered in lower part with long, simple (sometimes furcate) hairs, glabrous in upper part, bearing 1–7 leaves, rarely leafless; leaves densely covered with furcate and branched hairs, with longer and stiff, simple and furcate cilia at margin, radical leaves oblong-obovate, tapering into a petiole, cauline leaves sessile, oblong-ovate or

ovate-lanceolate, subacuminate, few-denticulate or subentire, 8–40 mm long, 3–11 mm broad. Raceme many-flowered (10–60), rather loose at flowering, corymbose, strongly elongating and spreading in fruit; pedicels long, thin, glabrous, spreading in fruit; sepals oblong-elliptic, strongly tapering at apex, covered with simple hairs; petals narrow, oblong-obovate or spatulate, slightly notched at apex, 3.5–4.5 mm long, pale yellow; silicles linear or elliptic-lanceolate, ascending, 9–18 mm long, 1.5–2.5 mm broad, about as
451 long as pedicels (the lower often shorter, the upper longer), with short, simple hairs (f. lasiocarpa Pohle), very seldom glabrous (f. leiocarpa Pohle); style obscure, ca. 0.2 mm long; seeds bright rufous. May–June.

Centr. Asia: Mtn. Turkm., Pam.-Al., T. Sh., Dzu.-Tarb. Gen. distr.: Dzu.-Kash., Tib., Ind.-Him. (Himalayas). Described from western Tibet. Type in London.

87. **D. nemorosa** L., Sp. pl. (1753) 643; Ldb., Fl. Ross. I (1842) 154; Turcz., Fl. baic.-dahur. I (1842) 142; N. Busch in Fl. cauc. crit. III, 4 (1909) 406; ej. in Fl. Sib. et Or. Extr. III (1919) 387; Pohle, Dr. asiat. (1925) 3; Schulz, Draba (1927) 309; Kom., Fl. Kamch. II (1929) 181; Kryl., Fl. Zap. Sib. VI (1931) 1331. – D. nemoralis M. B., Fl. taur.-cauc. II (1808) 95. – D. macroloba Turcz. in Bull. Soc. Nat. Mosc., XXVII, 4 (1854) 341. – Ic.: N. Busch, Fl. Sib. et Or. Extr. 390 et tab. geogr. 393.

Annual; root thin, weak; stem simple or branching, in small plants stem slender, in larger more or less sturdy, 2–50 cm high, covered with thin, branched and furcate, sometimes also with simple hairs, bearing 3(1)–8(10) leaves, in smaller plants seldom leafless; radical leaves soon dying, oblong-obovate or oblong-elliptic, cauline leaves ovate or oblong-ovate, sessile, 3.5–45 mm long, 1.5–25 mm broad, subacuminate, dentate or subentire, with branched, furcate, and simple hairs. Raceme many-flowered (10–90) (rarely in very small plants 3–9-flowered), loose, corymbose at flowering, strongly elongating in fruit, usually broadly spreading; pedicels thin, long, filiform, glabrous, perpendicularly diverging from axis or slightly recurved or (especially in smaller plants) ascending in fruit; sepals ovate, covered with simple hairs; petals pale yellow, oblong-obovate, 2–3 mm long, somewhat emarginate or more or less straight-truncate; silicles oblong-elliptic to elliptic-linear, 4–12 mm long, 1.5–2.5 mm broad, much shorter than pedicels (often 2–3–4 times), obtuse, glabrous (var. leiocarpa Lindbl.) or with short, simple hairs (var. hebecarpa Lindbl.), style obscure; seeds small, brown. March–July. (Plate XXVI, Figure 5).

European part: all regions; Caucasus: all regions; W. Siberia: all regions; E. Siberia: all regions; Far East: all regions; Centr. Asia: Ar.-Casp. (northern part), Mtn. Turkm., Pam.-Al., T. Sh., Dzu.-Tarb. Gen. distr.: Scand., Centr. Eur., Bal.-As. Min., Dzu.-Kash., Mong., Jap.-Ch., N. Am. Described from Europe.

Note. In most cases the numerous forms and varieties of this species merely represent individual variations.

88. **D. muralis** L., Sp. pl. (1753) 642; Ldb., Fl. Ross. I, 155; N. Busch in Fl. cauc. crit. III, 4 (1909) 404; Schulz, Draba (1927) 304.

452 Annual; stem erect, simple or (rarely) branching, 6–55 cm high, bearing 2–8 leaves, covered with very short, stellate hairs; leaves with short,

stellate hairs, radical leaves obovate or ovate, obtuse, dentate, abruptly tapering into a narrow petiole, soon dying, cauline leaves broadly ovate, subacuminate, dentate, amplexicaul, smaller (usually markedly so) than the radical leaves, 2.5–20 mm long, 2–14 mm broad. Raceme 7–70-flowered, rather compact at flowering, corymbose, very strongly elongating in fruit; pedicels thin, filiform, glabrous or sparingly covered with short, stellate hairs, perpendicularly or subperpendicularly diverging from axis in fruit; sepals elliptic, with few simple hairs; petals white, 1.25–2 mm long, oblong-obovate, rounded at apex; silicles oblong-elliptic, 3–6 mm long, 1.5–2 mm broad, slightly shorter than pedicels, obtuse, glabrous, with obscure rudimentary style. April.

European part: Crim.; Caucasus: Cisc., S. Transc. Gen. distr.: Scand., Atl. Eur., Bal.-As. Min. Described from Europe. Type in England.

Series 29. **Lineares** Pohle. – Biennial or short-living perennial, with slender, weak root. Leaves oblong-obovate or oblong-spatulate, entire, covered with branched hairs, sometimes mixed with simple ones. Flowering stems slender, leafless, often two or three arising from one radical rosette. Raceme loose, strongly elongating in fruit; pedicels thin. Flowers small, yellowish white or yellow, petals narrow, spatulate; silicles oblong-elliptic or linear, glabrous or slightly pubescent, with obscure style.

1. Flowering stems very short, semiprostrate; petals ca. 2 mm long; silicles short (ca. 5 mm long) . . . . 89. **D. alticola** Kom.
+ Flowering stems erect; petals 2.5–4.5 mm long; silicles narrow, longer than 7 mm when ripe . . . . 2.
2. Petals 2.5–3 mm long; silicles narrowly elliptic or linear, 7–16 mm long, about as long as pedicels . . . 90. **D. melanopus** Kom.
+ Petals 3.5–4.5 mm long; silicles linear, 15–25 mm long, much longer than pedicels (often several times) . . . . 91. **D. aucheri** Boiss.

89. **D. alticola** Kom. in Trav. Soc. Nat. Pétersb., Bot. XXVI (1896) 103; Pohle, Dr. asiat. (1925) 108. – D. melanopus var. alticola Schulz, Draba (1927) 317.

Perennial, forming small shrubs; leaves oblong-spatulate, entire, subobtuse, 7–15 mm long, 2–3 mm broad, covered with short and thin branched
453 hairs; stems solitary or two or three arising from one rosette, slender, usually twisted, ascending or subprostrate, 1–5 cm long, glabrous or sparingly short-branched-hairy. Raceme 4–11-flowered, loose, strongly elongating in fruit, somewhat geniculate, often sharply asymmetrical; pedicels thin, glabrous, often curved in fruit; sepals elliptic, covered with short, branched and simple hairs; petals oblong-spatulate, obtuse, yellowish white, ca. 2 mm long; silicles oblong-elliptic, ca. 5 mm long, 1.25–1.5 mm broad, longer than or as long as pedicels, subacuminate or subobtuse, glabrous; style obscure. June. (Plate XXVI, Figure 1).

Alpine zone, 2,500–3,000 m. – Centr. Asia: Pam.-Al. Endemic. Described from the Zeravshan River basin. Type in Leningrad.

90. **D. melanopus** Kom. in Trav. Soc. Nat. Pétersb., Bot. XXVI (1896) 102; Pohle, Dr. asiat. (1925) 21; Schulz, Draba (1927) 317. — D. linearis Pohle, Dr. asiat. (1925) 20 (non Boiss. !).

Biennial or perennial, forming small, loose tufts or shrubs; leaves oblong-obovate or oblong-spatulate, subobtuse, entire, 5—18 mm long, 1.5—5 mm broad, densely covered with rather coarse, branched, furcate, and simple hairs, sometimes with stiff and simple cilia at margin; stems solitary or two or three arising from one rosette, slender, erect, leafless (very rarely with one leaf), 1.5—20 cm high, glabrous or sparingly pubescent with short, furcate, branched, and simple hairs. Raceme 4—16-flowered, loose, strongly elongating in fruit; pedicels thin, glabrous or slightly pubescent, ascending in fruit; sepals elliptic, densely covered with simple and furcate hairs; petals yellow (yellowish white when dry), narrow, spatulate, more or less straight-truncate at apex, 2.5—3 mm long; silicles narrowly elliptic or linear, subobtuse or subacuminate, 7—16 mm long, 1—2 mm broad, about as long as pedicels (the lower usually somewhat shorter, the upper slightly longer), glabrous or (rarely) short-simple-hairy (f. hebecarpa Pohle); style obscure, up to 0.2 mm long; seeds rufous. June—August. (Plate XXVI, Figure 2).

Alpine zone, 2,500—3,500 m. — Centr. Asia: Pam.-Al., T. Sh. **Gen. distr.**: Dzu.-Kash. Described from the Zeravshan River basin. Type in Leningrad.

91. **D. aucheri** Boiss. in Ann. Sc. Nat. Bot. 2 sér., XVII (1842) 166; Pohle, Dr. asiat. (1925) 23; Schulz, Draba (1927) 316. — Arabis sulphurea Boiss., Fl. Or. I (1867) 173. — Draba linearis Kom. in Trav. Soc. Nat. Pétersb., Bot. XXVI (1896) 101. — D. longisiliqua Bornm. in Verh. zool.-bot. Ges. Wien (1898) 554 (non Schmalh.). — D. bornmülleri N. Busch in
454 Acta Horti Jurjev. VII, 3 (1906) 143; ej. in Fl. cauc. crit. III, 4 (1909) 433 in nota.

Biennial or perennial, forming small, loose tufts or with solitary rosettes; root thin and weak; leaves oblong or oblong-obovate, cuneately tapering at apex, acutish, entire, 7—20 mm long, 2—5 mm broad, densely covered with rather rigid, branched, furcate, and simple hairs, sometimes with coarse, simple, and furcate cilia at margin; stems slender, leafless, solitary or two or three arising from one rosette, 3—13 cm high, covered in lower part with long, recurved, simple (sometimes partly furcate) hairs, glabrous in upper part. Raceme 3—14-flowered, loose, elongating and spreading in fruit; pedicels thin, ascending in fruit, glabrous or covered with single, short, furcate hairs; sepals ovate or elliptic, with rather long, simple and furcate hairs; petals yellow (usually yellowish white when dry), narrow, spatulate, almost straight or slightly emarginate, 3.5—4 mm long; silicles linear, often slightly curved, subobtuse or subacuminate, 15—25 mm long, 1—1.5 mm broad, much longer than pedicels (often several times), glabrous, ascending; style obscure, 0.1—0.2 mm long; seeds small, rufous. June—July.

Stony slopes and rock streams in the alpine zone, up to 3,000—3,300 m. — Centr. Asia: Pam.-Al., T. Sh. **Gen. distr.**: Iran. Described from Iran. Type in Geneva.

Genus 647. **EROPHILA** * DC.**

DC., Syst.II (1821) 356; Erophila sect. Drabae Rchb., Consp.(1828) 183.

Sepals equal, not saccate. Petals bipartite, white. Filaments free, edenticulate. Silicle ovate-oblong or linear, flattened, valves with one vein, flat or slightly convex; style very short or null. Seeds numerous, biseriate, immarginate, very small, funicle filiform. Cotyledons flat, embryo pleurorhizal. – Small annual, with entire, arranged rosetted leaves, and very thin, leafless flowering stems.

A Mediterranean-Central Asian genus in which some authors (Jordan, for example) have distinguished many species. We describe only the macrospecies. Shul'ts recognized 8 species, one of which he considered as highly questionable, another – E. boerhavii – I regard as a synonym of E. verna. On the other hand, I treat E. verna var. krockeri (Andrz.) Aschers. et Graebn. as a special species. Thus the total number of species is 7; 4 grow in the USSR.

455 1. Leaves linear; silicle-cells 7–8-seeded . . . . . 1. **E. minima** C. A. M.
+ Leaves oblong-ovate or elliptic, silicle-cells 16–24-seeded . . . . 2.
2. Silicles rounded-obovate . . . . 2. **E. praecox** (Stev.) DC.
+ Silicles narrower . . . . 3.
3. Silicles oblong-elliptic . . . . 3. **E. verna** (L.) Bess.
+ Silicles oblong-linear, acuminate at both ends . . . . 4. **E. krockeri** Andrz.

1. **E. minima** C. A. M., Verzeichn. Pfl. Cauc. (1831) 184; Boiss., Fl. Or. I (1867) 303; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1909) 450; Schulz in Pflzreich. (1927) 371. – Draba minima Ldb., Fl. Ross. I (1842) 156. – Ic.: Schulz in E.-Pr. Nat. Pflzf. B 17b (1936) fig. 322, J–O.

Annual; stems 0.5–10 cm high, solitary or many; leaves linear, entire or dentate, simple-hairy; petals 1.5–2 mm long, nearly twice as long as the calyx; fruiting pedicels 2–15 mm long; silicles obovate, tapering slightly toward apex, slightly convex, 3–5 mm long, 2–2.5 mm broad; cells 7–8-seeded. March.

Solonetzic dry places, Artemisia semideserts. – Caucasus: E. Transc.; Centr. Asia: Amu D. **Gen. distr.**: Syria, Iran. Described from environs of Baku. Type in Leningrad.

Note. Var. turkestanica Schulz is recorded from the Pamir-Alai area and Syria. It is distinguished by shorter leaves (4–5 mm long and 0.5–1 mm broad).

2. **E. praecox** (Stev.) DC., Syst. II (1821) 357; N. Busch in Fl. cauc. crit. III, 4 (1909) 451. – Draba praecox Stev. in Mém. Soc. Nat. Mosc., III (1812) 269. – D. verna var. siliculis lato-ellipticis v. suborbiculatis Ldb., Fl. Ross. I (1842) 156. – Ic.: Rchb., Ic. Fl. Germ. tab. XII, f. 4233 (sub Draba praecoce); Schulz in E.-Pr. Nat. Pflzf. B 17 b (1936) fig. 322, H–F.

Annual; stems 1–8 cm high; leaves oblong or elliptic, with reduced petioles, sparsely scabrous-pubescent with branched hairs. Sepals 1–1.75 mm long; petals 2–3.5 mm long; fruiting pedicels 2.5–17 mm long; silicles obovate-orbicular, 3–6 mm long, 2.5–3.5 mm broad. March.

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* From the Greek er – spring and phileo – I love.

** Treatment by N.A.Bush.

Steppes, dry hills and dry slopes. — European part: Crim.; Caucasus: Cisc., Dag., E. Transc., Tal.; Centr. Asia: Ar.-Casp.; Balkh., Syr D., Kara K., Kyz. K., Amu D. **Gen. distr.**: Centr. Eur., Bal.-As. Min., E. Med., Arm.-Kurd., Iran. Described from eastern Transcaucasia, from Elenendorf [now Khanlar]. Type in Helsingfors.

156 3. **E. verna** (L.) Besser, Enum. (1822) 26; Schulz in Pflzr. (1927) 345; E. Meyer, Preuss. Pflzgatt. (1839) 179. — Draba verna L., Sp. pl. (1753) 642; Shmal'g., Fl. I (1895) 92. — E. boerhavii (van Hall.) Dumort., Fl. belg. (1827) 120. — D. verna var. siliculis ellipticis, utrinque rotundatis, Ldb., Fl. Ross. I (1842) 155. — Erophila vulgaris DC., Syst. II (1821) 356; Boiss., Fl. Or. I (1867) 304; N. Busch in Fl. cauc. crit. III, 4 (1909) 452. — Ic.: Rchb., Ic.: Fl. Germ. tab. XII, f. 4234 (sub Draba verna); Schulz in E.-Pr. Nat. Pflzf. B. 17 b (1936) fig. 321.

Annual; stems 2—27 cm high; leaves oblong, sessile, sparsely scabrous-pubescent with branched hairs. Sepals 1—2.25 mm long; petals 1.75—4 mm long; fruiting pedicels 2—30 mm long; silicles oblong-elliptic, 5—10 mm long, 1.75—3.3 mm broad; seeds rufous-brown, oval or suborbicular, 0.6 mm long, 0.3—0.5 mm broad. March—April.

Dry and weedy places, roadsides, sandy places, steppes, and field crops, in the Caucasus to 1,800 m. — European part: Kar.-Lap., Lad.-Ilm., U. V., V.-Kama, U. Dnp., M. Dnp., V.-Don, Transv., Bl., L. Don, L. V., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; Centr. Asia: Ar.-Casp., Kara K., Kyz. K., Amu D., Syr D., T. Sh., Pam.-Al., Balkh., Mtn. Turkm. **Gen. distr.**: all Europe, Bal.-As. Min., E. Med., Arm.-Kurd., Iran., Kashmir. Described from Sweden. Type in London.

4. **E. krockeri** Andrz. ap. Bess., Enwm. (1822) 82, 103, Enumer. I, 10. — Erophila verna var. krockeri Asch. et Graebn., Fl. Nordöstl. Fläche (1898) 364; Schulz in Pflzr. H. 89 (1927) 355. — Draba verna Krocker, Fl. Siles. II, 2 (1790) 8, No. 1014 (non L.). — D. verna var. α Ldb., Fl. Ross. I (1842) 155. — Ic.: Krocker, l. c., tab. 28; Schulz, l. c., f. 34 B.

Annual; stems simple or branching, erect or the lateral ascending, 10—20 cm long in fruit; leaves lanceolate, more or less entire. Flowers small; calyx 1 mm long; petals 1.5 mm long; silicles oblong-linear, acuminate at both ends, 7—9 mm long, 1.5—1.75 mm broad. March—April.

Open places, slopes, hills, steppes, as a weed in field crops. — European part: M. Dnp., Bl. **Gen. distr.**: Centr. Eur. Described from Silesia (Breslau).

Note. This species is rather widely distributed; it is often confused with the related E. verna (L.) Bess.

Genus 648. **DIPLOTAXIS** * DC.**

DC., Syst. II (1821) 618; Prodr. I (1824) 221.

Sepals erect, not saccate. Petals oblong-obovate, long-clawed, yellow. Filaments edenticulate. A reniform nectariferous gland at base of the

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* From the Greek diploos — double and taxis — order.

** Treatment by I.T. Vasil'chenko.

457 shorter stamen, a liguliform nectariferous gland in front of each pair of the longer stamens. Ovary nearly always on a very short stalk (gynophore). Style short, stigma large, 2-lobed. Fruit a flattened, linear-lanceolate, bivalvular silique with 2-edged beak. Valves flat, with a distinct midrib and slender netted lateral veins. Septum rather stout, with undulant thick walls of epidermal cells. Seeds biseriate in each cell, ovate, slightly flattened at sides. Embryo with the radicle bent toward the groove formed by the longitudinally conduplicate cotyledons. Hairs simple. – Annual, biennial, and perennial plants, with erect, usually branching stems and usually pinnatifid or pinnatipartite leaves.

1. Petals 4–5 mm long . . . . 1. **D. viminea** (L.) DC.
+ Petals 6–12(14) mm long . . . . 2.
2. Silicles without stalks . . . . 3. **D. muralis** (L.) DC.
+ Silicles stalked . . . . 3.
3. Fruit stalks ca. 1 mm long, style very short, ca. 0.5–1 mm . . . . 4. **D. cretacea** Kotov.
+ Fruit stalks 2–3 mm long, style 1–2.5(3) mm long . . . . 2. **D. tenuifolia** (L.) DC.

1. **D. viminea** (L.) DC., Prodr. I (1824) 222; N. Busch, Fl. cauc. crit. III, 4 (1908) 261. – D. saxatilis Ldb., Fl. Ross. I (1842) 220. – Sisymbrium vimineum L., Sp. pl. ed. II (1763) 919.

Annual, 5–20 cm high; stems slender, covered in lower part with small retrorse hairs; leaves radical (stems rarely bear 1–3 leaves), oblong, pinnatipartite, with obtuse, ovate, sometimes suborbicular lateral lobes and larger terminal lobe, rather long-petioled, sparsely covered with simple hairs (mainly along margin). Raceme loose; sepals 3 mm long; petals 4–5 mm, yellow, gradually tapering into a claw; siliques few, 15–20 mm long, ca. 1.5–2 mm broad, oblong-linear, tapering at both ends, terminating in a 2–2.5 mm long style, glabrous; pedicels 5–15 mm long, covered with short, retrorse hairs; seeds short-elliptic, grayish yellow, 0.8–1 mm long. May–August.

Calcareous and stony slopes, and dry hills. – European part: Crim. **Gen. distr.**: Med., Bal.-As. Min. Described from Sicily. Type in London.

2. **D. tenuifolia** (L.) DC., Prodr. I (1824) 222; Ldb., Fl. Ross. I (1842) 220; N. Busch in Fl. cauc. crit. III, 4 (1908) 262; Boiss., Fl. Or. I (1867) 387. – Sisymbrium tenuifolium L., Amoen. Acad. IV (1759) 259. – Brassica tenuifolia Shmal'g., Fl. I (1895) 80.

458 Perennial, 40–60(80) cm high; stem erect, branching, leafy, coarse, and woody at base, dispersely covered in lower part with retrorse hairs; leaves oblong, long, glabrous, pinnatipartite or pinnatisect, with lanceolate-linear or linear more or less dentate to entire lateral lobes, and a long, dentate or pinnatifid terminal lobe. Raceme elongating in fruit. Sepals glabrous, 5–6 mm long; petals 7–12 mm long, gradually tapering into a claw, yellow; siliques sparse, 25–50 mm broad (1.8)2–3 mm, style 1–2 mm long, fleshy; pedicels glabrous, 15–40 mm long; fruit stalks distinct, 2–3 mm long. May–September.

Steppes, hills and as a ruderal plant in steppes, habitation, etc. — European part: Crim., Bl. **Gen. distr.**: all of western Europe (except Scand.), As. Min. Introduced into Leningrad and other Baltic Sea ports from western Europe. Described from Italy, France, Switzerland. Type in London.

Note. Var. integrifolia Boiss. is distinguished within this species by its simple, dentate leaves.

3. **D. muralis** (L.) DC., Syst. II (1821) 634 et Prodr. I (1824) 222; N. Busch in Fl. cauc. crit. III, 4 (1908) 260. — Sisymbrium murale L., Sp. pl. (1753) 658. — Brassica muralis Shmal'g., Fl. I (1895) 80.

Annual or biennial, (15)30—50 cm high, with stem usually branching from base, dispersely covered mostly with spreading, somewhat retrorse hairs in lower part; leaves oblong, more or less sinuate-dentate to pinnatipartite, with lanceolate lobes, sparingly pilose along petioles and veins. Sepals 3—4 mm long; petals yellow, (6)7—8 mm long, obovate, abruptly tapering into a claw; siliques 25—50 mm long, 2—2.5 mm broad, glabrous, with a fleshy, finely-ribbed tapering beak, 2—3 mm long, and a distinctly 2-lobed stigma; pedicels 5—20 mm long (in lower part of plant some fruiting pedicels attain a length of 60—80 mm); seeds yellow-brown, ca. 1 mm long, 0.5—0.75 mm broad, short-elliptic. June—July.

Stony, pebbly slopes and as a ruderal plant in steppes, hedges, roadsides, etc. — European part: M. Dnp., introduced into the north up to Leningrad, Crim., Bl.; Caucasus: Cisc., W. Transc. **Gen. distr.**: all of western Europe. Described from France and Sicily. Type in London.

4. **D. cretacea** Kotov in Ukr. Bot. Zhurn. III (1926) 17.

Annual, biennial (?) or perennial, 40—60(80) cm high, stems many-branched, covered in lower part with short, retrorse hairs, glabrous above; leaves crowded below, oblong, pinnatipartite or pinnatisect, with oblong-lanceolate, almost rounded lobes, obtuse at apex. Sepals 4—5 mm long, pilose; petals
459 7—9 mm long, yellow; siliques 30—40 cm long, ca. 2—2.5 mm broad, glabrous, with a very short (0.5—0.75—1 mm) fleshy style at apex, with stalks ca. 1 mm long; fruiting pedicels glabrous or dispersely pubescent, 15 mm long; seeds brown, oval, 1 mm long, 0.5 mm broad. May—October.

Chalky slopes. — European part: V.-Don (bordering L. Don). Endemic. Described from the environs of Valuiki. Type in Leningrad.

Genus 649. **BRASSICA*** L.**

L., Sp. pl. (1753) 666.

Sepals erect or spreading, slightly saccate. Petals long-clawed, yellow, obovate. Filaments free, edenticulate. A generally reniform nectariferous gland inside base of the shorter stamens, a large gland in front of each pair of the longer stamens. Ovary sessile, style short, stigma large, depressed-capitate, more or less 2-lobed. Valves (of the more or less long silique) with a distinct midrib and less distinct lateral netted veins. Beak not spongy, conical or subulate, generally containing seeds. Epidermal cells of septum with stout, undulate walls. Seeds spherical or ovoid, uniseriate. Embryo with radicle lying in the groove formed by the conduplicate cotyledons.— Annual or perennial, simple-hairy or completely glabrous.

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* From the Greek brazo — I cook.

** Treatment by E.N. Sinskaya. Manuscript revised by editors.

1. Cauline leaves more or less amplexicaul . . . . 2.
+ Cauline leaves sessile or short-petioled, not amplexicaul . . . . . . 6.
2. Leaves fleshy, large, the cauline not fully amplexicaul.
Beak short, stout . . . . 3.
+ Leaves relatively thin, not fleshy, the cauline amplexicaul.
Beaks longer and thinner, gradually angustate . . . . 4.
3. Beak inflated, obtuse, short, 3–6 mm; leaves grayish-green;
petals usually yellow. Cultivated plants . . . . 1. **B. oleracea** L.
+ Beak gradually attenuate, often longer; petals often white.
Wild plants . . . . 2. **B. cretica** Lam.
4. Beak ca. $^1/_4$–$^1/_5$ as long as valves; lower leaves very sparingly
pubescent, often glabrescent. Cauline leaves semiamplexicaul.
Flowers usually above buds at flowering . . . . 3. **B. napus** L.
460 + Beak $^1/_2$–$^1/_3$ (rarely $^1/_4$) as long as valves. Lower leaves green,
pubescent. At flowering flowers below buds . . . . 5.
5. Roots thin. Annual . . . . 4. **B. campestris** L.
+ Roots sturdy, fleshy, edible. Biennial . . . . 5. **B. rapa** L.
6. Siliques short, 1–2 cm long, on 3–4 mm long pedicels, appressed
to stem . . . . 9. **B. nigra** Koch.
+ Siliques and pedicels longer, spreading . . . . 7.
7. Siliques with a short gynophore, 4 mm long. Beaks short,
up to 3 mm long . . . . 6. **B. elongata** Ehrh.
+ Siliques without gynophore. Beaks longer . . . . 8.
8. Flowers small, petals up to 7 mm long. Beaks long, 1–2.8 cm . . . . .
. . . . 8. **B. tournefortii** Gouan.
+ Flowers larger. Beaks short, ca. 7 mm long (not longer than
12 mm). Pedicels short . . . . 7. **B. juncea** (L.) Czern.

Section 1. BRASSICOTYPUS Dumort. in Fl. belg. (1827) 122. — Ovary many-seeded (9–48 ovules). Siliques usually long, 1.5–10 cm. Beaks conical or subulate, 1- or 2-seeded, rarely without seeds.

1. **B. oleracea** L., Sp. pl. ed. 1 (1753) 667; N. Busch in Fl. Sib. et Or. Extr. II (1915) 167. — B. oleracea α silvestris L., Sp. pl. ed. 2 (1763) 932; Metzger, Syst. Beschreib. cult. Kohlart. (1833) 12.

Biennial; stem tall, leafy; lower leaves very large, fleshy, lyrate-pinnatisect, adjacent, short-petioled, with prominent nerves; middle cauline leaves more or less amplexicaul; whole plant grayish green, glabrous. Raceme with many large flowers; petals yellow; siliques very large, up to 10 cm long, reclinate; beak stout, subobtuse, short, 4–6 mm long, rarely 15 mm; seeds large, dark brown, ca. 2 mm long, spherical, slightly alveolate.

Grown in vegetable gardens throughout the Soviet Union except for the Far North of Siberia and Central Asian deserts. **Gen. distr.**: all countries of the temperate zone of Europe, to a lesser degree America and Asia.

Cultivation is possible in the subtropics, during the cold season or in the mountains. Its origin and distribution as a wild plant is the Mediterranean area (along the coast).

Economic importance. Cabbage is one of the more important vegetable plants. Apparently, its cultivation dates back to prehistoric times. The Romans and Greeks knew of 3–10 kinds of cabbage. In 1822, De Candolle distinguished up to 30 forms; at present this figure runs into hundreds.
461 The nutritive value of cabbage derives from the following composition which varies, depending upon the strain of cabbage: nitrogenous substances 1.27–3.78%, fats 0.16–0.67%, and carbohydrates 5.25–8.56%. The following varieties of cabbage, each of which includes many forms, are distinguished. Kale – B. oleracea var. acephala DC., not forming heads, with fleshy, flat or very wavy leaves; a fodder but also a vegetable plant. "Cabbage" – B. oleracea var. capitata L. – usually a vegetable garden plant. Savoy cabbage – B. olearea var. sabauda L., also a headed cabbage but the leaves are thinner, rugose or crimpy; the head smaller. Bud cabbage or Brussels sprout – B. oleracia var. gemmifera DC., in the leaf axils along stem there are small buds which are used as vegetables. Cauliflower – B. oleracea var. botrytis L., with widely spreading and branching inflorescences and abortive, white, granular flowers, sessile on fleshy, succulent, white pedicels; the most delicious variety. Kohlrabi – B. oleracea var. gongylodes L., with a strongly thickened, short, turnip-shaped or globose stem, edible, with the taste of cabbage heart.

2. **B. cretica** Lam., Encycl. I (1783) 747. – B. balearica Aggeenko, Obzor rast. Kryma, 59, non Pers.; N. Busch in Fl. cauc. crit. III, 4 (1908) 277.

Perennial; stem woody at base, tall; radical leaves lyrate-pinnatifid, all leaves fleshy, glaucous, often bluish. Flowers rather large; petals white; siliques with longer beaks than in the former.

Seashores and cliffs. – European part: Crim. **Gen. distr.**: E. Med. (along the coasts of Greece, Syria, Crete, Cyprus, and other islands). Described from Crete. Type in Paris.

Note. The wild cabbage has been badly treated taxonomically. In order to define the species more accurately, much more material than is now accessible is needed, as well as experimental-genetic investigations. We find it very unlikely that our Crimean wild cabbages belong to B. balearica Pers., from which the former is distinguished by the color of the petals and more leafy stem (in B. cretica, the petals are pale yellow and white, in the Crimean plants they are white, in B. balearica they are yellow). It is more reasonable that the Crimean plants, whose locality is contiguous with B. cretica, ? pertain to this species rather than to the geographically distant B. balearica. Wide disjunctions within the range are not generally common to the genus Brassica. On the other hand, this does not preclude the possibility that all these cabbages represent geographic races of one species group.

3. **B. napus** L., Sp. pl. ed. 1 (1753) 666; Ldb., Fl. Ross. I (1842) 217; Shmal'g., Fl. I, 78; N. Busch in Fl. cauc. crit. III, 4 (1908) 276 et Fl. Sib. et Or. Extr. I (1913) 174; Metzger, Syst. Beschr. cult. Kohlart. (1833); Sinskaya, Maslich. i kornepl. Cruciferae (1928) 245. – Ic.: N. Busch, Fl. Sib. et Or. Extr. I, 174.

462 Annual or biennial; stem erect, high, leafy; lower leaves lyrate-pinnatifid, glabrescent or rarely pubescent; in the biennial forms leaves larger, rosetted; middle cauline leaves semiamplexicaul, upper leaves entire, sessile; entire plant (including lower leaves) glaucous. Inflorescence a raceme (at flowering, open flowers lower than buds); petals golden-yellow or dull yellow, limbs obovate, gradually tapering into a short claw shorter than the limb and calyx; siliques long, 5–10 cm, plane or slightly torulose; pedicels 1–3 cm long, ascending or horizontal; valves with obscure lateral nerves; beaks thin, attenuate-conical, 1–2 cm long, seedless, rarely 1–2-seeded, one-fifth to one-sixth as long as valves; seeds globular, dark brown, slightly alveolate, up to 1.8 mm in diameter.

Cultivated for oil (rape, plant with slender root), as a vegetable and for cattle fodder (turnip, plant with a stout, fleshy root). – European part: the entire, nonchernozem belt up to the Arctic Circle (turnip); Belorussia, western Ukraine (rape); Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; Siberia: W. and E., very rarely.

These plants in their wild and, apparently, weedy state are not encountered within the Soviet Union (and the existence of genuinely wild plants throughout the distribution range is doubtful). **Gen. distr.**: Eur. (except the Arctic), N. Afr. (rape), N. Am. (grows everywhere as cultivated plant, seldom as a weed).

Note. We do not separate rape (B. napus oleifera Metzger) and swede turnip (B. napus rapifera Metzger) as two independent species because the geographical type of rape has not been sufficiently investigated.

Economic importance. Cultivated forms: edible swede turnip B. napus var. esculenta DC., with a stout, edible, rugose root. The yellow-fleshed plant, which is used for food, and the coarser white-fleshed plant, which is used for fodder, are distinguished by the color of the root. According to the shape of the root, it is divided, like the turnip, into compressed, round and oval forms. There is less variability in the swede turnip than in other kinds of turnip. Alquier notes that swede turnip contains 1.1% nitrogenous substances, 0.16% fats, 7.3% carbohydrates. The seeds of rape – B. napus var. oleifera DC. – contain up to 42–43% oil, which dries slowly outdoors. The seeds are reddish, yellowish, or pale cherry-colored.

4. **B. campestris** L., Sp. pl. ed. 1 (1753) 666; N. Busch, Fl. cauc. crit. III, 4 (1908) 274; Fl. Sib. et Or. Extr. II (1915) 170; Kom., Fl. Kamch. II (1929) 167. – B. rapa Ldb., Fl. Ross. I (1842) 216. – B. rapa α campestris et β oleifera Shmal'g., Fl. I (1895) 78. – B. campestris var. oleifera praecox DC., Syst. II (1821) 589. – B. rapa oleifera annua Metzger, Syst. Beschr. cult. Kohlart. (1833) 51; Sinsk., Maslichn. i kornepl. Cruciferae (1928) 56. – Ic.: N. Busch, Fl. Sib. et Or. Extr. I, 172 et tab. geogr. 173.

463 Annual; root thin, inedible, stem 20–100 cm high, erect, branching; lower leaves lyrate-pinnatifid, green, pubescent; cauline leaves amplexicaul, glabrous or the lower slightly pubescent. Inflorescence corymbose subanthesis (flowers higher than buds); petals golden-yellow, claw shorter than limb and sepals; fruiting pedicels reclinate at a sharp angle, 3–8 cm long; silique valves with a distinct midrib and small distinct lateral nerves, plane or somewhat torulose; beak oblong-conical, with a thin tip, seedless or 1-seeded, one-half to one-third (rarely one-fourth) as long as valves; seeds 1.2–1.8 mm in diameter, reddish-grayish brown, irregularly spherical, with a rather distinct radicle.

A field and vegetable garden weed. Cultivated in small measure for oil.— European part: everywhere, except the Arctic; Caucasus: all farming lands as a weed, Transc. — cultivated for oil; Centr. Asia: everywhere as a weed, in Pam.-Al., and T. Sh., and other areas cultivated as an oil-plant; W. and E. Siberia: encountered as a weed in farming localities, often in Altai and usually in southern regions; Far East: seldom, as a weed. The plant is not known growing wild anywhere. Gen. distr.: temperate countries of Europe, Asia and America (as a weed); cultivated in As. Min., Afghanistan, N. Ind., Iran. Probable point of origin — Middle Asia.

Note. In our survey of cultivated Cruciferae (1928), we combined field cabbage B. campestris with turnip B. rapa into one species. We have now come to the conclusion that B. campestris (field cabbage) should be recognized as an independent species since it represents a system of geographical types that are not compatible with the types of turnip — B. rapa. The Central Asian cultivated and weed varieties of B. campestris are distinguished by glaucescent and glabrescent lower leaves and for this reason have often been erroneously designated as B. napus, but the shape of fruit and number of chromosomes (20) indicate explicitly that these forms belong to B. campestris. Fedchenko (Rast. Turk. 1915) and Korzhinskii (Ocherk rast. Turk. 1896, Sel.-khoz. ocherk Roshana i Shugnana, 1898) incorrectly determined these forms as turnip, B. napus.

5. **B. rapa** L., Sp. pl. ed. 1 (1753) 666. — Brassica rapa var. rapifera Metzger, Syst. Beschr. cult. Kohlart. (1833) 247; Sinsk., Masl. i kornepl. Cruciferae (1928) 103. — B. rapa var. esculenta Shmal'g., Fl. I (1895) 78.

Biennial; root thickened, fleshy, edible; rosettes of green pubescent leaves develop in the first year (with the exception of some Central Asian varieties with lower glabrous leaves); stems tall, many-leafy. Inflorescence like in the preceding species; petals golden-yellow or a dull pale yellow; siliques larger, beak one-third to one-fourth as long as valves; seeds much larger.

464 Cultivated throughout the Soviet Union as a food (turnip) and as a fodder plant ("turneps"). — European part: mainly in the nonchernozem zone. Cultivation is even possible north of the Arctic Circle; rarely in the south; Caucasus: rarely; W. and E. Siberia: cultivated in small measure, may grow far in the north; Far East: rarely; Central Asia: generally everywhere except for the desert. Unknown from anywhere in the wild. Gen. distr. (cultivated): all temperate Europe, and part of southern Asia (Ind.). Two centers of origin: the Mediterranean area and Central Asia.

Note. The taxonomic position of the biennial, thin-rooted forms ("winter" field cabbage) is unclear. We assume that they belong here. The diagnoses, except for the peculiarities of the root do concur. These forms of field cabbage are not encountered in the Soviet Union.

Economic importance. Cultivated turnip — B. rapa var. rapifera Metzg. Yellow-fleshed and white-fleshed turnips are distinguished by the color of their roots. The white-pulped plant has lemon-yellow flowers, the yellow-pulped golden-yellow. Turnips are usually compressed, rounded and oblong, according to the shape of the root. The flat and some of the rounded kinds are used as food, the elongate, which we call "turneps," are used as fodder. The seeds of the oil-turnip — B. rapa var. oleifera DC. — contain about 45% oil.

6. **B. elongata** Ehrh. Beitr. Naturk. VII (1792) 159; DC., Syst. II (1821) 604; Shmal'g., Fl. I, 80; N. Busch in Fl. cauc. crit. III, 4 (1908) 269. — B. armoracioides Czern. ex Turcz. in Bull. Soc. Nat. Mosc. XXVII, 2 (1854) 311. — Eurcastrum elongatum Rchb. Fl. Germ. excurs. 694 (1832): Ldb., Fl. Ross. I, 219, 769. — Ic.: W. et K. Ic. pl. rar. Hung. tab. 28; Rchb. Ic. Fl. Germ. f. 4450.

Biennial (or perennial); stem 60—130 cm high, erect, branching usually from the middle; lower leaves short-petioled, oblong-obovate, more or less sinuate-pinnatifid, with a rather broad midrib; all leaves slightly fleshy, glaucescent. Inflorescence corymbose subanthesis, later becoming racemose; petals yellow; siliques 1.5—3 cm long, on strongly reclinate pedicels, torulose, with a small, seedless beak 1—3 mm long, with distinctly conspicuous stalk (gynophore) at base 1.5—4 mm long; seeds darkly grayish brown, globular, 1—1.5 mm in diameter, very finely alveolate. May—June.

Crops, roadsides, fallow fields and steppes. — European part: all parts of the nonchernozem zone; common in V.-Kama, Middle and L. V., M. Dnp., U. V., U. V., V.-Don, L. Don, Bl., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc.; W. Siberia: U. Tob., Irt., Alt., Ob; Centr. Asia: Kara K., Kyz. K. **Gen. distr.**: Hungary, Bal.-As. Min., Iran. Described from Hungary. Type in Moscow.

465 **Economic importance.** Produces semisiccative oil suitable for food, light, and paint. Seeds with about 34% fatty oil.

7. **B. juncea** (L.). Czern., Consp. pl. Chark. (1859) 8; Cosson in Bull. Soc. bot. France VI (1859) 609; Shmal'g., Fl. I (1895) 77; N. Busch in Fl. cauc. crit. III, 4 (1908) 283; Sinskaya, Maslich. i kornepl. sem. Cruciferae (1928) 331. — Sinapis juncea L., Sp. pl. (1753) 668; DC., Syst. II, 612; Boiss., Fl. Or. I, 394. — Ic.: Hort. Vindob. tab. 171.

Annual; stem branching, glabrous; lower leaves green, distinctly petioled, pilose or glabrescent, lyrate-pinnatifid, rarely subentire or wavy-pinnate; cauline leaves glaucescent, not amplexicaul, middle leaves resembling the lower in shape, upper leaves entire, sessile (rarely short-petioled). Inflorescence almost corymbose; flowers at onset of flowering on the same level of buds (but in some Asiatic forms the inflorescence is completely racemose); petals golden-yellow; limb not as gradually tapering to a claw as in the field cabbage, longer than claw; ovary 12—20-ovuled; fruiting pedicels reclinate at an angle of 45°, 8—17 mm long, 2.5—5 cm long [sic]; siliques more or less tubercled, valves with a very distinct midrib, the lateral netted veins more distinct than in rape and field cabbages; beak thin, subulate, ca. one-fourth as long as silique, 7—12 mm long; seeds dark brown, rarely yellow, distinctly alveolate, 1.0—1.3 mm in diameter. April—May.

Cultivated in southeastern Europe, the Ukraine, the North Caucasus, and Central Asia for oil and mustard powder. Lately it has been suggested that it be grown still further north: for example, in Belorussia and some parts of Siberia. — European part: as a weed in crops, roadsides, close to habitation, Bl., L. V., L. Don, V.-Don, Transv., U. V., Crim., rare in the nonchernozem zone. Caucasus: sporadically in Cisc., more common in E. and W. Transc., Tal.; W. Siberia: Ob, in the steppe and steppical-forest zones, sporadically in the taiga areas where farming is carried out; E. Siberia: Yenis., Ang.-Say., seldom in crops; Far East: Okh., Uss.; Centr. Asia: nearly everywhere, in steppes, fallow fields, and crops; T. Sh., Pam.-Al., Kara K., Kyz. K.

Gen. distr.: from Hungary to Mong., Jap.-Ch., Ind., Afghanistan, Iran., As. Min., Arabia. Wild in Mong., N. Ch., apparently, in Centr. Asia and the steppes of S. Sib. The species is of an Asiatic origin.

Economic importance. An excellent nectar plant. The seeds of B. juncea and of the species of Sinapis contain fatty oil, in addition to volatile "mustard" oil. There is about 25–30% fatty oil in the seeds. Volatile oil is extracted by alcohol, forming mustard spirit. The oil has a burning effect on the skin which is the reason why India mustard is used for mustard plasters. India mustard is drought-resistant and is used as green manure and as fodder for young cattle.

466 8. **B. tournefortii** Gouan in Illustr. Observat. Bot. (1773) 44, tab. XX A; DC., Syst. II (1821) 602; Ldb., Fl. Ross. I, 217; N. Busch in Fl. cauc. crit. III, 4 (1908) 273. – Sinapis caspica Willd. in herb. ex Ldb., l. c. in synon.

Annual; root long; stem 10–60 cm high, often branching, slightly flexuous, hirsute at base, glabrous above; lower leaves more or less rosetted, short-petioled, lyrate-pinnatifid; upper leaves sessile, entire, all leaves hispid-hirsute. Inflorescence compressed at flowering, later elongating; flowers small; petals 5–7 mm long, pale yellow, sometimes with a violet tinge, limb gradually tapering into a claw. Fruiting pedicels 1–3.2 cm long; siliques 3.5–7 cm long, torulose, with a long beak 1–2.3 cm, 2- or 1-seeded; valves yellowish, sometimes with a violet tinge; seeds reddish brown, with a black hilum. April–May.

Dunes, roadsides, and fields in the maritime belt. – Caucasus: E. Transc., Tal., along the shores of the Caspian; Centr. Asia: Kara K., Kyz. K. **Gen. distr.**: Iran. Described from Iran. Type in Geneva.

Note (editors). The description by E. N. Sinskaya refers to B. tournefortii var. sisymbrioides Fisch, in DC. (l. c.).

Section 2. **MELANOSINAPIS** Boiss., Fl. Or. I (1867) 390. – Sepals ascending. Ovary 5–16-ovuled. Siliques small, 1–2.5 cm long. Beaks short, thin, subulate, seedless.

9. **B. nigra** Koch in Röhling, Deutsche Fl. ed. 3, IV (1833) 713; Ldb., Fl. Ross. I, 217; Shmal'g., Fl. I, 77; N. Busch in Fl. cauc. crit. III (1908) 268; Sinsk., Masl. i kornepl. Cruciferae (1928) 380.

Annual; stem erect, glabrous or hispid below; branches thin, usually with an anthocyanin spot in axils; all leaves green, middle and upper leaves glabrous, the lower leaves pubescent, lyrate-lobate, with large terminal lobe, distinctly petioled; cauline leaves petioled. Inflorescence loose, racemose; petals pale yellow; limb abruptly tapering to a claw, shorter than the claw; fruiting pedicels 2.5–8.5 mm long; siliques tetragonous, 1–2.5 cm long, appressed to stem in typical forms and distinctly torulose; valves with distinct midrib and obscure lateral nerves, abruptly terminating in very thin and short beak 1.5–4.7 mm long; seeds spherical, dark brown, finely alveolate, ca. 1.5 mm in diameter.

Cultivated for mustard powder and volatile oil. It is not cultivated now in the USSR. Encountered very rarely as a weed. – European part: L. V.,

M. V., Crim.; Caucasus: S. Transc. Gen. distr.: Centr. and S. Eur., N. Afr., Abyssinia, As. Min., Afghanistan, Ind. In the Mediterranean countries the plant is apparently found growing wild. Introduced into N. Am. Described from Europe.

467 Genus 650. SINAPIS * L.**

L., Sp.pl.ed.1 (1753) 668.

Sepals spreading, not saccate. Petals yellow, limb obovate, claw shorter than limb. A reniform or rectangular nectariferous gland inside base of the shorter stamens and one liguliform gland in front of each pair of longer stamens. Ovary sessile, with a beak gradually tapering into the style. Stigma large, somewhat 2-lobed. Fruit a bivalvular silique with a long, more or less laterally compressed or 2-edged (ensiform) beak. Valves firm, convex, torulose, with 3–7 rather distinct nerves. Septum stout, with very thick-walled, multangular epidermal cells. Seeds uniseriate, globular. Cotyledons 2-lobed, embryo radicle lying in a groove formed by the conduplicate cotyledons. Hairs simple. – Annual, with entire or lyrate leaves.

1. Fruit beak tetragonous. Fruiting pedicels thick, directed upward . . . . 1. S. arvensis L.
+ Fruit beak ensiform. Fruiting pedicels thinner and longer, subhorizontal or reclinate at an obtuse angle . . . . 2. S. alba L.

Section 1. **CERATOSINAPIS** DC., Syst. II (1821) 607. – Fruit beak conical or tetragonous, not flat. Beak with 1–2 orthotropous (not pendulous seeds), rarely seedless.

1. **S. arvensis** L., Sp. p. (1753) 668; Ldb., Fl. Ross. I, 218; Boiss., Fl. Or. I, 394; Kom., Fl. Kamch. II, 168. – Brassica sinapistrum Boiss., Voy. bot. Midi de l'Esp. II (1839–1845) 39; Shmal'g., Fl. I, 78; N. Busch in Fl. cauc. crit. III, 4 (1908) 278.

Annual; stem 10–100 cm high, branching, usually covered with spreading simple hairs; reddish violet spots often in axils of branches; lower leaves lyrate-pinnatifid, all leaves hairy, rarely glabrescent, upper leaves sessile, oblong-ovate, acuminate at apex. Sepals 4–7 mm long; petals 9–11 mm long, claw narrow, somewhat shorter than limb; siliques 18–33 mm long (excluding beak), cylindrical or tetragonous; pedicels short and rather stout, 3–7 mm long, 1–2 mm thick, directed at an acute angle from axis, sometimes subappressed to stem; valves 3-nerved, firm, torulose, prolonged into an tetragonous beak, 1–2 cm long, often 1-seeded; seeds dark brown or nearly black. May–June.

468 Crop weed, sometimes at roadsides, sandy places, fallow fields, vegetable gardens. – European part: Lad.-Ilm., U. Dnp. and M. Dnp., Bl., U. V., V.-Don, L. Don, L. V., Dv.-Pech., V.-Kama, Transv., Crim.; Caucasus: Cisc., Dag.,

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* From the Greek sinapi – mustard.

** Treatment by E.N.Sinskaya. Manuscript revised by editors.

W., E., and S. Transc., Tal.; W. Siberia: Ob, U. Tob., Irt., Alt.; E. Siberia: Ang.-Say., Dau.; Far East: Okh.; Centr. Asia: Ar.-Casp., Kara K., Kyz. K., Balkh., T. Sh., Pam.-Al. Gen. distr.: all Europe, N. Afr., As. Min., Arm.-Kurd., Iran., Syria, Mesopotamia. Described from Europe. Type in London.

Note. The taxonomic position of this species is obscure. According to experiments of E. N. Sinskaya it is not crossed with the typical species of the genus Brassica. Due to the 3-nerved valves it might be temporarily placed in the genus Sinapis, not Brassica. Its origin is the Mediterranean area.

Economic importance. The fatty oil is used for food after hydrogenation, as well as in soapmaking. The leaves, stems, and seeds are edible. In some parts of the Caucasus the leaves are eaten like lettuce; the non-flowering stems are also used after stripping as food. It is a medical and nectariferous plant, and a noxious weed in crops and vegetable gardens.

Section 2. LEUCOSINAPIS DC., Syst. II (1821) 220. — Fruit beak compressed, ensiform, with pendulous seeds.

2. **S. alba** L., Sp. pl. (1753) 668; Ldb., Fl. Ross. I, 218; N. Busch in Fl. cauc. crit. III, 4 (1908) 257. — S. dissecta Lag., Catal. H. Madrit. (1816) 20; N. Busch in Fl. cauc. crit. III, 4 (1908) 258; Sinsk., Masl. i kornepl. Crucif. (1928) 407. — Brassica alba Shmal'g., Fl. I (1895) 78. — B. dissecta Shmal'g., l. c., 79. — Ic.: Rchb., Ic. Fl. Germ., f. 4424; Moris, Fl. Sardoa, tab. 12 (S. dissecta). — Exs.: Fries, Herb. norm. fasc. 7; Kerner, Fl. exs. Austro-Hung. No. 3262. (S. dissecta).

Annual; stem 25—100 cm high, often completely covered with rigid, recurved, bristly hairs, sometimes glabrescent; lower leaves lyrate-pinnatifid into 2—3 pairs of lateral lobes, the terminal lobe broadly ovate, 3-lobulate, upper leaves with shorter petioles and with smaller number of more sharply outlined lobes; rarely the lower leaves strongly dissected into narrow lobes; all leaves hirsute, rarely glabrescent; limb one and one-half times as long as claw; fruiting pedicels spreading, rarely ascending, 0.8—1.3 cm long; siliques straight or curved, coarse, torulose, usually covered with rigid, spreading hairs, rarely glabrous, 2—4 cm long, with beak flat, ensiform, seedless, or 1—2-seeded, as long as or longer than valves, seldom somewhat shorter; siliques sometimes (in flax weed forms) with very short valves, 1—2-seeded; seeds white yellowish.

469 In crops, riverbanks, roadsides, and fallow fields. — European part: up to 65°N.; often in chernozem areas, L. V., M. V., Crim.: Caucasus: in the steppical part of Cisc.; E. and W. Siberia: seldom in the agricultural areas; Centr. Asia: foothills of T. Sh. (very rarely). Gen. distr.: all Europe except for the extreme north, N. Afr. Origin in Mediterranean area.

Note. In our opinion combining S. alba and S. dissecta into one species instead of viewing them as two independent species, is more correct for the following reasons: 1) these two species cross with each other as easily as forms of one species; 2) they have the same number of chromosomes; 3) hybrids between S. alba and S. dissecta are normally fertile; 4) the distinguishing characters of these species combine independently in the second generation and are, apparently, due to a small number of factors; 5) neither intermediates nor new forms are observed in the second generation as often occurs in interspecific crossings; 6) natural transitional forms do exist; 7) the distribution area of S. dissecta is within the range of S. alba.

Economic importance. White mustard or the English Sinapis alba is cultivated for its oil — ca. 35—37% — in the seeds. The fresh, young plant is good for fodder; it is sown as a green fodder. It is also a noxious weed.

Genus 651. **ERUCA** * ADANS.**

Adans., Fam.d.pl.II (1763) 418.

Sepals erect, not saccate. Petals long-clawed, white, yellow or violet, dark-veined. Ovary sessile, style distinct, stigma rounded. An inflated, crescent-shaped, nectariferous gland inside base of the shorter stamens, a short, liguliform, nectariferous gland in front of each pair of the longer stamens. Fruit a short, bivalvular silique with a long, flattened, seedless beak; valves convex, with a distinct midrib. Septum rather delicate, epidermal walls multangular, with thick, undulate walls. Seeds uniseriate or biseriate, slightly compressed. Cotyledons rounded, conduplicate, with radicle lying in a groove formed by the folded cotyledons. Hairs simple. — Annual, with pinnatisect leaves.

A Mediterranean genus, apparently originated in northwestern Africa. One of the 5 species is encountered in the Soviet Union.

1. **E. sativa** Lam., Fl. Franc. II (1778) 496; Ldb., Fl. Ross. I, 221, 770; Boiss., Fl. Or. I, 396; Suppl. 66; N. Busch in Fl. cauc. crit. III, 4 (1908) 255; Sinskaya, Masl. i kornepl. Cruciferae (1928). — Brassica eruca L., Sp. pl. (1753) 667; Shmal'g., Fl. I, 79. — E. cappadocica Reut., Catal. Horti Genev. (1857) sec. Boiss., Diagn. Ser. II, VI, 13; Fl. Or. I, 396; Trautv., Incr. 93; N. Busch in Fl. cauc. crit. III, 4 (1908) 255. — Ic.: Rchb., Ic. Fl. Germ. f. 4421; Sibth. et Sm., Fl. Graec. tab. 646 et 647. — Exs.: A. Bge., A. Lehmann reliq. bot. No. 157. 470

Annual; stem erect, branching, up to 40 cm high; lower leaves lyrate-pinnatisect, all leaves slightly fleshy, sparsely pilose, rarely glabrous, with a unique odor. Sepals 9—12 mm long; petals 15—22 mm long, obovate-cuneate, whitish or sulfur-yellow, violet- or brown-veined, sometimes slightly emarginate; fruiting pedicels rather stout, almost appressed to stem; siliques ovate-oblong or oblong, compressed, not torulose, 2—3 cm long; valves firm, with prominent midrib; beak 5—10 mm long, ensiform, compressed; seeds biseriate, light brown, 1.5—3 mm long, 1—2.5 mm broad. April—May.

A weed in crops, rare. — European part: M. Dnp., Bl., L. Don, V.-Don, Crim.; Caucasus: Cisc., Dag., E. and S. Transc.; Siberia: somewhere in the southwestern part; Centr. Asia: cultivated in some places for oil. Gen. distr.: Mediterranean countries of Europe and Africa, wild and as a weed.

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* From the Latin uro — I burn, from the hot taste of the seeds.

** Treatment by E.N.Sinskaya. Manuscript revised by editors.

In Asia Minor, Abyssinia, Afghanistan and India it is cultivated for oil and grows as a weed, chiefly in flax fields. Described from Europe. Type in London.

Note. According to the diagnoses, E. cappadocica Reut. is distinguished mainly by the long beak and the size of the seeds. E. sativa is a highly variable species. A multitude of forms is found at the same locality; these are distinguished from another not less, and sometimes more, than E. cappadocica is distinguished from the typical E. sativa. For this reason, I do not regard the first as an independent species (Sinskaya: Rocket salat, a little-known oil and salad plant (Indau, maloizvetnoe maslichnoe i salatnoe rastenie) in Tr. Prikl. Bot. 14, 1925).

Economic importance. Leaves and seeds are edible. In the Caucasus the leaves are used in soup and as lettuce. The seeds are prepared for mustard. Cultivated as an oil plant (in Tatar, solobur). As a noxious weed in crops.

Genus 652. **HIRSCHFELDIA** * MOENCH **

Moench, Methodus (1794) 269; Hayek, Crucif.-Syst.(1911) 259; N.Busch in Fl.cauc.crit.III, 4 (1908) 263.

Sepals erect, not saccate. Petals yellow, entire; filaments free, simple. A 3-lobed, nectariferous gland inside base of the shorter stamens, and a 471 large, nectariferous gland in front of each pair of the longer stamens. Ovary sessile, style short, stigma capitate. Fruit a bivalvular silique, cylindrical, with a distinct, conical, small beak nearly always containing one seed at base; valves convex, with a midrib, often torulose; septum delicate, with irregularly multangular, transversally elongated epidermal cells. Seeds uniseriate, slightly flattened; cotyledons obtuse, longitudinally conduplicate. Hairs simple. — Annual, with much branching stem.

A Mediterranean genus of 7 species, one of which is encountered in the Soviet Union.

1. **H. incana** (L.), Lagr.-Foss., Fl. Tarn. (1847); Lowe, Man. Fl. Mad. (1868) 586. — H. adpressa Moench, Method. (1724) 264; Boiss., Fl. Or. I. (1867) 390; N. Busch in Fl. cauc. crit. III, 4 (1908) 263. — Sinapis incana L., Cent. pl. I (1755) 19; Amoen., Acad. IV, 280. — Erucastrum incanum Koch, Synops., Fl. Germ. ed. I (1837) 56; Ldb., Fl. Ross. I (1842) 219. — Brassica incana Shmal'g., Fl. I (1895) 79 (non Ten., non Mal.). — Ic.: Rchb., Ic. Fl. Germ. f. 4423; Schulz in E.-Pr. Nat. Pflzf., 2 Aufl., B. 17b (1936) 338, fig. 185.

Annual, thickly gray-downy, hairs in lower part of stem recurved downward; stem 30—65 cm high; radical leaves lyrate or with ovate crenate-dentate lobes, cauline leaves few, small, the middle and upper oblong-linear, entire or dentate; pedicels as thick as siliques and as long as sepals, 2.5—3 mm long; sepals 3 mm long; petals 4—6 mm long, obovate, tapering to a claw; siliques 7—10 mm long (excluding beak), torulose, appressed to axis, beak 3—5 mm long, straight or bent. May.

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* After K.L.Hirschfeld of Holstein, who published a book on horticulture in 1755.

** Treatment by N.A.Bush.

Stony steppes, dry slopes, ruderal places, and roadsides, up to 1,000 m. – European part: Crim.; Caucasus: Dag., E. Transc., Tal. Gen. distr.: Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Europe. Type in London.

Genus 653. **RAPISTRUM*** DESV.**

Desv. in Journ. bot. III (1813) 150; Hayek, Crucif.-Syst. (1911) 265; N. Busch in Fl. Cauc. crit. III, 4 (1908) 265.

Sepals spreading, slightly saccate at base. Petals oblong, clawed, yellow or white. Filaments edentate. An oblong-tetragonous or reniform or multangular nectariferous gland inside base of the shorter stamens, a short-liguliform, nectariferous gland outside each pair of the longer stamens. Ovary sessile, style very short, stigma shortly 2-lobed. Fruit indehiscent, 2-jointed, lower joint oblong or resembling a pedicel, longitudinally 472 nerved, seedless or 1–2-seeded, upper joint globose or ellipsoidal, abruptly tapering into a conical or subulate beak, with 4–8 longitudinal ribs, transversally rugose, with straight seed and thin septum appressed to wall. Cotyledons longitudinally conduplicated. Hairs simple. Annual or biennial, with pinnatisect leaves and short fruiting pedicels.

A genus of 10 species common to the Mediterranean and parts of Central Europe; two grow in the Soviet Union.

1. Style conical, shorter than upper joint of fruit . . . . 2. R. perenne (L.) All.

+ Style subulate; longer than upper joint of fruit . . . . 1. R. rugosum (L.) All.

1. **R. rugosum** (L.), All., Fl. Pedemont. 1 (1785) 257; Ldb., Fl. Ross. I (1842) 223; Boiss., Fl. Or. I (1867) 404; Shmal'g., Fl. I (1895) 82; N. Busch in Fl. cauc. crit. III, 4 (1908) 289. – Myagrum rugosum L., Sp. pl. (1753) 640. – Ic.: All., Fl. Pedemont. (1785) tab. 78; Rchb., Ic. Fl. Germ. f. 4168. – Exs.: Kerner, Fl. exs. Austro-Hungarica, No. 73.

Annual; stem 30 cm–1 m high, scabrous, obscurely ribbed, branching with erect branches; leaves scabrous, the radical lyrate, petiolate, terminal lobe large, ovate, dentate, lateral lobes triangular, upper leaves oblong-lanceolate or ovate-lanceolate, sinuate-dentate, subsessile. Sepals 2.5–3 mm long; petals 5–7 mm long; fruiting pedicels 2.5–3 mm long, thickened at tip, appressed to axis; silicles downy (var. dasycarpum Trautv.) or glabrous (var. gymnocarpum Trautv. ex N. Busch), lower joint 2.5–3.5 mm long, the upper globular, 2.5–3 mm long, style 3–3.5 mm long. May.

Wormwood steppes, clayey solonetzic semideserts, dry hills and slopes, crops, waste and roadsides, up to 1,400 m. – European part: M. Dnp., V.-Don, L. Don, L. V., Transv., Bl., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; Centr. Asia: Ar.-Casp., Kara K., Mtn. Turkm. Gen. distr.: Atl. and Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from Europe. Type in London.

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* From the Latin rapa – turnip.

** Treatment by N.A. Bush.

2. **R. perenne** (L.), All., Fl. Pedemont. I (1785) 258; Ldb., Fl. Ross. I (1842) 223; Shmal'g., Fl. I (1895) 81. — Myagrum perenne L., Sp. p. (1753) 893. — Rapistrum costatum DC., Syst. II (1821) 433.

Perennial; stem 30—60 cm high, hirsute, divaricately branched below; leaves hirsute, the lower irregularly pinnatipartite, the upper sessile,
473 entire, dentate. Sepals equal at base; petals yellow, 5 mm long; fruiting pedicels as long as silicles; silicles appressed to axis, 5—7 mm long, the lower joint oblong, ribbed, the upper broadly ellipsoidal, 8-ribbed, ending with a short conical style shorter than the upper joint. End of May, June.

Fields and roadsides. — European part: M. Dnp., V.-Don, L. Don, Bl. **Gen. distr.**: Eur., Apennines, Bal.-As. Min. Described from Europe. Type in London.

Note. Ledebour (l. c.) described R. costatum DC., distinguished by the upper joint of the silicle thickened above, unribbed, thick-walled. However, such fruits are found together with those typical for R. perenne (L.) All., even on the same single raceme.

Genus 654. **CAKILE*** MILL.**

Miller, Gard. Dict. 4 ed. I (1754) 118; DC., Syst. II (1821) 427.

Sepals erect, the lateral saccate at base. Petals long-clawed, lilac or white. Filaments free, edentate. A crescent-shaped, interiorly slightly emarginate nectariferous gland on inner side of the shorter stamens, and a gland in front of each pair of the longer stamens. Ovary sessile. Style null. Stigma broad, sessile. Fruit 2-jointed, the lower joint cylindrical, truncate above, unilocular, with one pendulous seed or seedless, upper joint flattened, smooth, with one erect seed, both joints aseptate. Cotyledons linear, thick, flat, embryo pleurorhizal, rarely notorrhizal. — Branching, glabrous annual, with entire or thick, pinnate leaves.

A genus of four species common to the seashores of Europe, Central America, and the Gulf of Mexico; one species is encountered in the USSR.

1. **C. maritima** Scop., Fl. Carniol., ed. 2, II (1772) 35; Ldb., Fl. Ross. I, 168, 758; Shmal'g., Fl. I (1895) 175; N. Busch in Fl. cauc. crit. III, 4 (1910) 225. — Bunias cakile L., Sp. pl. (1753) 236. — Ic.: Rchb., Ic. Fl. Germ. II, f. 4158; Schulz in Pflzr., IV, 105 (1923) 20. — Exs.: Rchb., Fl. Germ. exs. 361.

Annual; stem 10—40 cm high, divaricately branched; leaves pinnatipartite, somewhat fleshy, lobules linear, generally entire, obtuse. Sepals 3—4 mm long; petals pinkish violet, 7—10 mm long; fruiting pedicels 4—6 mm long, ca. 1.5 mm thick, ascending; silicles 18—22 mm long, lower joint usually 2-toothed above, upper joint ensiform, unilocular, 1-seeded; seed erect. March—June.

474 Sandy shores of the Baltic, Azov and Black seas. — European part: Lad.-Ilm., Bl., L.-Don, Crim.; Caucasus: Cisc., W. Transc. **Gen. distr.**: Scand., Atl. Eur., Med., Bal.-As. Min. Introduced into the eastern (Atlantic) shores of N. America. Described from Europe. Type in London.

Economic importance. Seeds contain fatty oil.

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* Arabic name for this plant (kakeleh).

** Treatment by N.A.Bush.

Genus 655. **CRAMBE** * (TOURN.) L.**

L., Sp.pl.ed.I (1753) 671.

Sepals spreading. Petals white, rarely golden-yellow, entire, cuneately or abruptly tapering at base into a short claw; filaments free, elongate in upper part, usually denticulate outside, rarely edenticulate. A small, concave, nectariferous gland inside the shorter stamens, a large gland in front of each pair of the longer stamens. Ovary sessile. Style short, stigma subsessile. Fruit an indehiscent, 2-jointed silicle; upper joint (later becoming the fruit) rather developed, 1-seeded, globose or ovoid, at first slightly fleshy, then becoming dry, firm, aseptate; lower joint short, cylindrical, seedless, much shorter than the upper joint. Cotyledons 2-lobed, conduplicate, with radicle lying in groove. – Annual or perennial herbs or undershrubs, with large entire or pinnatipartite leaves, covered with simple hairs or glabrous.

Economic importance. A nectar and fodder plant. The stem and leaves of some species in Central Asia are stored for winter fodder. The roots of some species (C. maritima, C. kotschyana, C. litwinowi) are edible, since they contain large quantities of starch and sugar. C. kolschyana is of industrial importance; in recent years it has been used for distillation of alcohol. Some species are wholly used for food (C. maritima, C. litwinowi in the Volga area, C. tataria, C. aspera, and C. orientalis in the Caucasus).

1. Upper joint of silicle very small, 2–3(4) mm long; branches very thin . . . . 11.
+ Upper joint of silicle large, 3–10 mm long; branches thick . . . . . 2.
2. Radical leaves large, long-petioled, cordate-reniform or ovate-orbicular . . . . 3.
475 + Radical leaves lyrate or 1–2-pinnatipartite but not cordate . . . . . 4.
3. Stem glabrous; leaves thin, green on both sides, deeply cordate at base, incised and sharply toothed; upper joint 4.5–5 mm long, oval-ovate, smooth, firm, with capitate stigma . . . . 1. **C. cordifolia** Stev.
+ Stem with sparse, rigid, spreading hairs; leaves cordate-reniform or ovate-orbicular, crenate-lobate; upper joint 5.5–6 mm long, subglobular, spongy-inflated, obtuse, slightly veined and with 4 smooth edges . . . . 2. **C. kotschyana** Boiss.
4. Upper joint ovoid or globose, smooth or torulose but not tetragonous and not netted-wrinkled . . . . 5.
+ Upper joint tetragonous (with 4 sharply prominent ribs), distinctly netted-wrinkled . . . . 8.
5. Completely glabrous, glaucous plant . . . . 6.
+ Plant with stiff hairs . . . . 7.
6. Leaves fleshy, ovate or elliptic-oblong, undulate at margin or shallowly and irregularly sinuate-lobate; upper silicle joint large, 7–9 mm long, ovoid or subglobose, fleshy . . . . 3. **C. maritima** L.

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* From the Greek krambe – cabbage.

** Treatment by E.G.Chernyakovskaya.

+ Leaves pinnatifid or pinnatipartite, with oblong, large-toothed lobes; fruit globose, obtuse, 5.5–6 mm long . . . 4. C. pinnatifida R. Br.

7. Stems 40–100 cm high. Fruit spongy, torulose-rugose, 7–9 cm long, slightly acuminate at apex . . . . 5. C. aspera M. B.

+ Stems low, up to 30 cm high; fruit spongy, globose 5–7 mm long, the mature obtuse, torulose, with separate prominent tubercles . . . . 6. C. gibberosa Rupr.

8. Upper joint of silicle 3–5 mm long . . . . 9.

+ Upper joint of silicle 6–8 mm long . . . . 10.

9. Fruiting pedicels 7–10(18) cm long, glabrous or with stiff hairs. Upper joint globose, 4–5 mm long . . . . 8. C. tataria Sebeok.

+ Fruiting pedicels short, 5–7 mm long, sparsely hispid. Upper
476 joint ovoid, 3–3.5 mm long, 2.5 mm broad . . . . . 7. C. litwinowi Gross.

10. Leaves thin, glabrous, bipinnatipartite, with narrow acute lobes. Fruit tetragonous, subglobose, 6–7 mm long, 5–6 mm broad, small-beaked . . . . 10. C. steveniana Rupr.

+ Leaves thick, coriaceous, with sparsely ciliate stiff hairs along veins and at margin. Fruit ovoid, 7–8 mm long . . . . 9. C. grandiflora DC.

11. Leaves pinnatilobate or lyrate. Longer filaments denticulate . . . . 12.

+ Leaves entire, cordate-ovate or elliptic-ovate; longer filaments edenticulate . . . . 11. C. edentula (Fisch. et Mey.) Korsh.

12. Plant completely glabrous . . . . 12. C. armena N. Busch.

+ Plant pubescent . . . . 13.

13. Lower part of stem, leaves and petioles covered with simple hairs . . . . 14.

+ Plant with semblance of stellate hairs: few rigid hairs grouped on tubercles . . . . 18. C. schugnana Korsh.

14. Leaves and petioles densely pubescent . . . . 15.

+ Leaves and petioles sparsely hairy . . . . 16.

15. Leaves and petioles densely appressed-short-pubescent. Leaves large, pinnatilobate. Flowers white; petals 4–5 mm long; fruit weakly 4-ribbed, 3–4 mm long . . . . 16. C. orientalis L.

+ Lower part of stem, petioles and leaves densely covered, especially beneath, with long hairs, glabrescent above. Leaves smaller, lyrate, with 1–2 small, cuneate lobules and large, ovate, obtuse terminal lobe. Flowers bright yellow; petals 6 mm long. Fruit small, smooth, 3 mm long, 2 mm broad . . . . 17. C. gordjagini Spryg. et Pop.

16. Leaves (especially along veins), petioles, and lower part of stem sparsely covered with long, retrorse hairs . . . . 17.

+ Stem, petioles and midrib of leaves with rigid, hooked prickles . . . . 15. C. aculeolata (N. Busch) Czerniak.

17. Stem 30–70 cm high. Flowers small, petals 3–5 mm long; fruit globose, smooth, 3–4 mm in diameter . . . . . . 14. C. juncea M. B.

+ Stem up to 2.5 m high. Flowers large, sepals bright gold, petals white, 4–6.5 mm long; fruit subglobose, nearly smooth, 4–4.5 mm long, 3–4.5 mm broad . . . . 13. K. koktebelica (Junge) N. Busch.

Section 1. SARCOCRAMBE DC., Syst. II (1821) 650, 651. – Lower joint of silicle thick, oval, compressed. Silicles usually wrinkled or ribbed. – Perennial, usually with thick leaves and stout, multicipital root.

477 1. **C. cordifolia** Stev. in Mém. Soc. Nat. Mosc. III (1812) 267; Ldb., Fl. Ross. I, 223; Shmal'g., Fl. I, 82; N. Busch in Fl. cauc. crit. III, 4 (1908) 301; Schulz in Pflanzr. (1919) 235.

Perennial; stems glabrous, 1–1.5 m high, many-branched; radical leaves large, 13–31 cm long, 14–28 cm broad, long-petioled, thin, green on both sides, ovate or reniform, deeply cordate at base, incised, acute, irregularly toothed, dispersely hairy along petioles and sometimes also above, more densely covered beneath and along nerves with thin, short, and bristly hairs, more densely pubescent when young; cauline leaves very few, short-petioled, rhombic-ovate, glabrous, strongly toothed, 6–13 cm long, 5–10 cm broad, the uppermost filiform, entire, small, 0.5–1 cm long. Inflorescence branching, glabrous, leafless, only with minute aculeate leaves, branches elongate, sparsely flowered; sepals ca. 3 cm long; petals white, obovate, 6–7 mm long; filaments shortly toothed; fruiting pedicels 10–15 mm long, ascending-erect, glabrous; upper joint of silicle 4.5–5 mm long, oval-ovate, suborbicular, smooth, firm; stigma capitate. Fl. May–July, Fr. July.

Steppes, open places. – Caucasus: Cisc. Endemic. Described from the environs of Mozdok and Georgievsk. Type in Leningrad.

Note. The small-fruited var. microcarpa (Rupr. in herb.) is described from the above localities by N. Busch in Fl. cauc. crit., l. c., p. 301 – with silicles nearly twice as small, oval-ovate, smooth, 2.75–3.5 mm long, 2–2.75 mm broad.

2. **C. kotschyana** Boiss., Diagn., Ser. 1, 6 (1845) 19; Fl. Or. I (1867) 406; O. and B. Fedch., Konsp. I (1906) 92. – C. edentula Korsh. in Bull. Acad. 5 Ser. IX, 5 (1898) 421 (quod spec. Becker. non Fisch. et Mey.). – C. severzowi Rgl. in Bull. Soc. Nat. Mosc. (1870) No. 3, 282 et in A. H. P., V, 1 (1877) 243. – C. palmatifida Rgl. et Schm. in A. H. P., V (1877) 243. – C. cordifolia var. kotschyana Schulz in Engl., Pflzr., IV, 105 (1919) 236. – Ic.: Opred. r. okr. Tashk. II (1924) fig. 204. – Exs.: Sint., Iter transc.-pers. No. 1761 et 128 sub C. cordifolia.

Perennial; root fleshy, stems up to 1.5–2.5 m high, branching, ribbed (as are the branches) with sparse, rigid, spreading hairs; radical leaves large, up to 35 cm long and 50 cm broad, long-petioled, cordate-reniform or ovate-orbicular, broadly cordate at base, strongly crenate-lobate, triangularly and sharply toothed, more or less coriaceous, green above, scabrous, softer and glaucous beneath, hirsute on both sides but especially below along veins and petioles, the young leaves densely covered below with soft hairs, cauline leaves petiolate, ovate or rhombic-oblong, acutely lobate. Inflorescence large-paniculate, branches dense corymbiform, many-flowered, elongating in fruit; sepals 4–5 mm long, with rigid bristles; petals white, 7.5–11 mm 478 long, obovate; filaments long-toothed; fruiting pedicels thin, long, 2–4 cm, ascending-erect; upper joint of silicle 5.5–6 mm in diameter, globose, smooth, obtuse, slightly netted-veined, with 4 smooth edges, spongy-inflated. Fl. March–May, Fr. May–June. (Plate XXVII, Figure 1).

Pebbly, grassy, clayey foothill slopes, 1,400–4,000 m, also stony, calcareous slopes of high foothills and steppes. — Centr. Asia: Mtn. Turkm., Syr D., Pam.-Al., T. Sh. **Gen. distr.**: Iran., W. Tib. Described from the Kotschy collection of southern Iran.

Note. This species is distinguished from the similar Caucasian C. cordifolia Stev. by the pubescence of the leaf, the less deeply notched blade and the larger, spongy fruit.

On examining Kotschy's authentic specimen from Iran, it is impossible not to observe the sparse pubescence of rigid hairs on stem, branches, pedicels and sepals, disappearing with age; Boissier apparently did not mention this phenomenon in his diagnosis (l. c. 19) and it led Regel to describe the new species C. severzowi Rgl., which is distinguishable from C. kotschyana Boiss. by nothing more than the pubescence of the entire plants. Schulz, in his monograph (l. c.), recorded C. kotschyana as a variety of C. cordifolia Stev., subdivided in turn into two subvarieties, based on the Turkestan Regel palmatifida and severzowi; palmatifida, distinct by the large division of the radical leaves as noticed by Shul'ts in the cultivated specimens, and of which Regel made no note in his diagnosis, and severzowi, distinct — as stated above — by the more dense pubescence of the entire plant.

There are no radical leaves on older herbarial specimens of C. palmatifida, and there is nothing in the more recent collections in support of the conclusions of Shul'ts; the occurrence of merely one form of cauline leaves does not provide sufficient grounds for the division of this species.

Economic importance. This plant is one of the best nectar plants in Kazakhstan and Kirghizia. Its roots are edible and nutritive. In recent years it has gained wide attention because it contains large quantities of starch and sugar. Aitchison (Not. on products of W. Afgan., 46) indicates that it may be of some importance for distilleries. The young shoots and leaves of this plant provide excellent fodder for livestock, especially camels. In Central Asia, the stems and leaves are stored for the winter as forage.

3. **C. maritima** L., Sp. pl. ed. 1 (1753) 671; Ldb., Fl. Ross. I, 222; Shmal'g., Fl. I, 82; N. Busch in Fl. cauc. crit. III, 4 (1908) 301–303; Schulz in Engl. 479 Pflzr., IV, 105, 229–231. — C. pontica Stev. ex Rupr., Fl. Cauc. (1869) 293 nomen. — Ic.: Rchb., Ic. Fl. Germ. f. 4164. — Exs.: Fl. cauc. exs. No. 207.

Perennial, glabrous, glaucous; root stout; stem usually low, 50–60 cm high, erect, firm, angular, branching; branches ascending-erect; all leaves fleshy, the radical elliptic-oblong, ovate or suborbicular, undulate, emarginate or irregularly pinnatilobate, obtuse, asymmetrical at base, 10–23 cm long, 8–24 cm broad; petioles 3.5–13 cm long; cauline leaves short-petioled (petioles 1–2 cm long), oval or rhombic, acuminate, cuneate at base, ca. 6–8 cm long, 4–6 cm broad, the uppermost leaves oblong-linear, simple, 3–4 cm long, 2–3 cm broad, unevenly sinuate-dentate. Flowers aromatic, large; sepals 3–4.5 mm long; petals 7–9 mm long, broadly obovate, slightly notched at apex; inflorescence compressed after flowering; fruiting pedicels ascending-erect (8–26 mm long); fruit 7–9 mm long, ovoid or subglobose, fleshy, smooth or wrinkled. Fl. April–May, Fr. May–July. (Plate XXVII, Figure 2).

Maritime sands. — European part: Bl., L. Don, Crim.; Caucasus: Cisc., W. Transc. (Novorossisk). Gen. distr.: Eur., coastline. Described from the shores of the Arctic Ocean. Type in London.

Economic importance. In the Caucasus it is cooked and regarded as a useful vegetable.

4. **C. pinnatifida** R. Br. in Ait., Hort. Kew. ed. 2, IV (1812) 72; DC., Syst. II (1821) 652; N. Busch in Fl. cauc. crit. III, 4 (1908) 303, pro parte. — C. maritima subsp. pinnatifida Shmal'g., Fl. I (1895) 83. — C. tatarica var. pinnatifida Schulz, l. c., 235. — Ic.: Jacq., Ic. pl. rar. I (1781) tab. 128, ed. II, p. 4, tab. 93 sub C. orientali; Rchb., Fl. Germ. (1837—1838) 22, tab. II, f. 4165.

Perennial, entirely glabrous, glaucous; stem 50—70 (up to 150) cm high; radical leaves ca. 17—35 cm long, 23—26 cm broad, deeply pinnatifid or pinnatipartite to base, with large, oblong, sinuate-dentate lobes, alternating with smaller ones, the terminal lanceolate-spatulate; petioles 10—17 cm long. Inflorescence branching, with elongate branchlets; petals obovate, white; fruiting pedicels 7—10(17) mm long, ascending-erect, later becoming more horizontal; fruit globose, obtuse, 5.5—6 mm long, 5—6 mm broad, plane or weakly torulose. Fl. May, Fr. June—July.

Steppes and clayey slopes. — European part: M. Dnp., Bl., Crim. (Fedosiya). **Gen. distr.**: W. Eur. Described from Hungary. Type in London.

Note. In cultivation in England since 1759.

480 5. C. **aspera** M. B., Fl. Taur.-cauc. II (1808) 90 et III (1819) 420; Ldb., Fl. Ross. I, 223; DC., Syst. II (1821) 654; N. Busch in Fl. cauc. crit. III, 4 (1908) 303—304, p. p. — C. tatarica var. aspera Boiss., Fl. Or. I (1867) 406; Shmal'g., Fl. I (1895) 83; Schulz in Engl. Pflanzenr. IV, 105 (1919) 234. — Ic.: Deless., Ic. sel. II (1823) tab. 91; Rchb., I, 23, tab. II, f. 4167; Fl. Yugo-Vost. V (1931) fig. 370.

Perennial, hirsute, glaucous; stems 40 cm to 1 m high, angular at base; leaves not large, deeply bipinnatipartite, with oblong-linear remote teeth or incised lobes, radical leaves 14—25 cm long, 10—16 cm broad, cauline leaves dentate. Inflorescence hemispherical, glabrous; flowers small, white; sepals glabrous, 2.5—3 mm long; petals obovate, 5—6 mm long; pedicels glabrous, ascending-erect in fruit, 8—13 mm long; fruit spongy, torulose-rugose, not tetragonous, 7—9 mm long, 7—8 mm broad, slightly acuminate at apex. Fl. April—May, Fr. June—July.

Stony and solonetzic places in steppes. — European part: L. Don, L. V., Crim. Endemic. Described from the Lower Volga area. Type in Leningrad.

Note. The typical C. aspera (sparsely pubescent with stiff hairs, not disappearing with age, leaves small and fruit medium-sized) is encountered in the Lower Volga area, but according to Gross, Data on the Cretaceous Flora of the Saratov Province (Mat. melov. fl. Sarat. gub. Izv. Sarat. Obshch. Estestv. Vol. II, 1928, No. 2, p. 305) C. aspera is often found on chalky surfaces of the Saratov—Volga area and further to the south in the calcareous soils of the steppes and on chalky slopes.

As for the Caucasus, the typical C. aspera is not found there. The C. aspera reported by Ruprecht (Fl. Cauc. 136), should apparently be referred to C. gibberosa Rupr. (judging by the presence of prominent, solitary tubercles on the fruit). Our observations of specimens collected by Alekseenko in Dagestan show that the tetragonous netted-wrinkled fruit becomes smooth with age.

In his monograph (p. 234) Shul'ts united all the species under C. tataria Sebeok and reduced all the Caucasian large-fruited species (C. aspera N. Busch, Fl. cauc. crit. 303, non M. B.) into var. buschii O. Schulz; he retained the name var. aspera for the strongly pubescent plants of the Lower Volga area, of M. Bibershtein, and erroneously included C. gibberosa Rupr. with them. We feel it more proper to restore Ruprecht's species C. gibberosa.

6. **C. gibberosa** Rupr., Fl. Cauc. (1869) 136. — C. tataria var. buschii Schulz in Engl. Pflanzr., IV, 105 (1919), p. 234. — C. aspera Rupr., Fl. Cauc. (1869) 136; N. Busch, Fl. cauc. crit. III, 4 (1908) 304 p.

483 Perennial; stems low, up to 30 cm high, branching from base, at first pubescent, later glabrescent; the first leaves simple, obovate, large, blade up to 25 cm long, irregularly sinuate-lobate, with petioles up to 40 cm long, the proceeding radical leaves triangular, very large, up to 40 cm long and 50 cm broad, bipinnatipartite, with wide lobes, obtusely and broadly sinuate, densely hispid but pubescence becoming more sparse with age. Fruiting pedicels thin, short, up to 10 cm [sic], curved-spreading, pubescent; fruit large, spongy, subglobose, the young acuminate, 5–7 mm across, the mature fruit subobtuse, smooth, with separate, protruding, conoid tubercles. Fl. April, Fr. July.

Chalky hills and sands along the shores of the Caspian Sea. — Caucasus: Dag., E. Transc. Endemic. Described from Eastern Transcaucasia, from Beshbarmak near the Caspian. Type in Leningrad.

Note. Apparently a vicaroid of C. maritima on the Caucasian shore of the Caspian Sea.

7. **C. litwinowi** Gross in Fedde, Repert. XXIII (1927) 397; Izv. Sarat. Obshch. Estestvoisp. II, 2 (1928) 105; Voronov in Fl. Yugo-Vost., V (1931) 408. — Crambe sp. Klaus, Fl. Privolzhsk. stran (1852) 276; Litvinov in Maevsk., Fl. Sr. Ross., ed. V (1918) 67. — C. wolgensis Litw. in Gross, l. c. (1927) 398.

Perennial; root stout, fleshy, up to 6 cm across, together with petioles of radical leaves lilac-tinged; stems up to 35–70 cm high, many-branched, squarrose-hispid; leaves large, fleshy, green or glaucous, smooth, shiny above, dull beneath, with many but not dense, rigid, spreading bristles along nerves below and at margins of petiole, later more or less disappearing; blades of outer radical leaves oval or broadly ovate in outline, often recurved downward, blades up to 40 cm long (including petioles), 26 cm broad, deeply pinnatipartite, with more or less large, entire or obtusely 1–3-dentate lobes, petioles one-third as long as leaves; inner radical leaves much larger, rounded, with undulate, curved, irregularly dentate, obtuse-acuminate lobes, up to 50 cm long and 35 cm broad, petioles 12–15 cm long; middle cauline leaves several, of same shape as the lower; upper leaves lanceolate or linear-lanceolate, shallowly 1–3 sinuate-dentate, short-petiolate, the uppermost leaves entire. Inflorescence up to 50 cm across, hemispherical, much-branched; flowers white with a strong fragrance of honey; calyx

481)

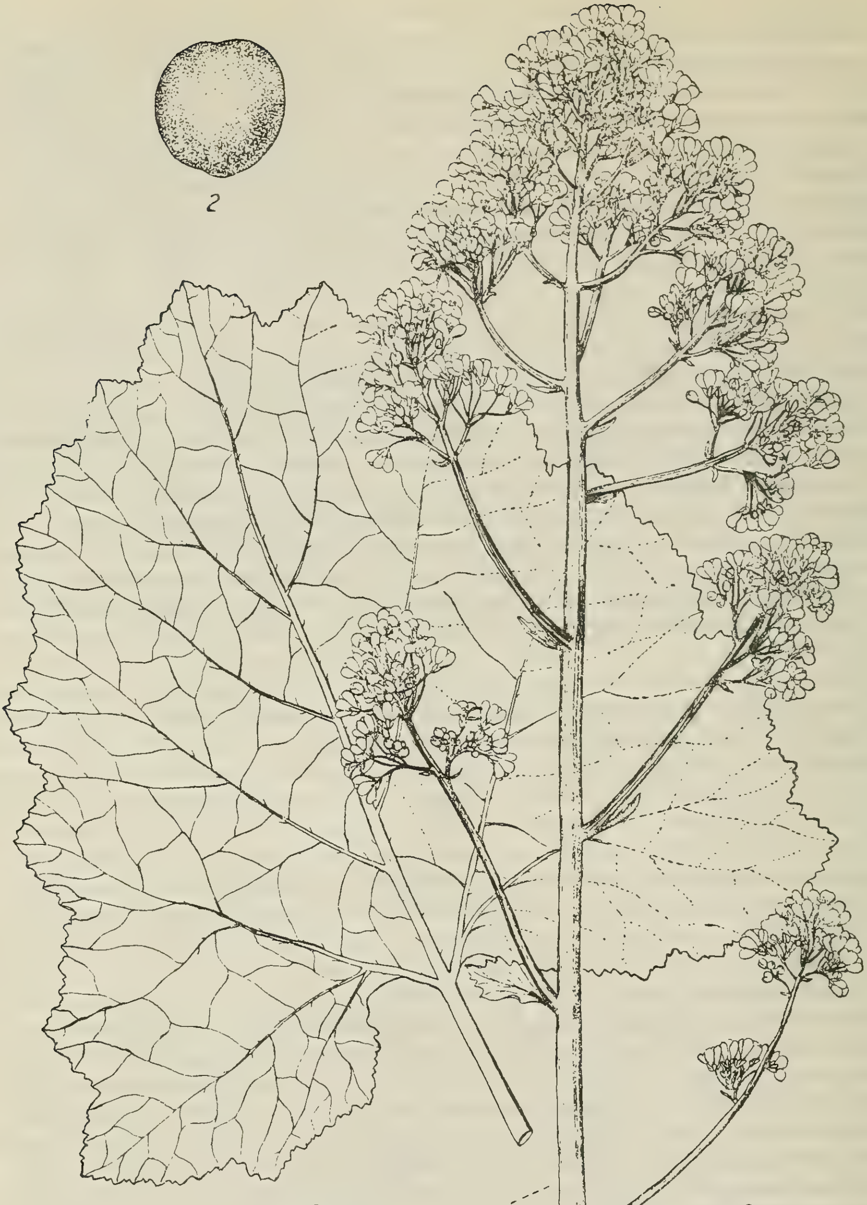

PLATE XXVII. 1 – Crambe kotschyana Boiss., flowers, leaves and fruit; 2 – C. maritima L., fruit.

484 caducous after flowering; sepals ovate, up to 2.5 mm long, greenish, narrowly white-membranous at margin; petals 3.5–4 mm long, 2.5 mm broad, two-thirds longer [sic] than sepals, obovate, with short, thin claw; fruiting pedicels ascending-erect, ca. 5–7 mm long, with very sparse, solitary bristles; fruit small, ovoid, 3.5 mm long, 2.5 mm broad, tetragonous, netted-veined, with a very short, obtuse mucro at apex; seeds spherical, smooth, ca 1 mm in diameter, grayish green, one in each silicle, rarely 2–3. Fl. May–June, Fr. July.

Chalky slopes. – European part: Transv. Endemic. Described from the environs of Khvalynsk, locality of Tashi. Type in Saratov, cotype in Leningrad.

Economic importance. Edible, consumed by local population. In addition, a good honey plant.

Note. C. litwinowi is related to C. tataria, as Voronov (l. c., 409) already indicated, but contrary to Gross (l. c.), is not related to C. aspera; it is readily distinguished from C. aspera by its tetragonous, small, netted-rugose fruit. From the closely related C. tataria, it is distinguished by its small, ovoid, netted-veined fruit, borne on ascending-erect, short pedicels sparsely covered with bristles, and by its lower stature.

8. **C. tataria** Sebeok, Diss. de Tatar. (1779) 7; Jacq., Miscell. II (1781) 274–291; DC., Syst. II (1821) 653; Ldb., Fl. Ross. I (1842) 222; N. Busch in Fl. cauc. crit. III, 4 (1908) 304; Schulz in Engl. Pflzr., IV, 105 (1919) 232; Voronov in Fl. Yugo-Vost. V (1931) 407; Shmal'g., Fl. I (1895) 83. – Ic.: Jacq., Ic. pl. rar. I (1781) 13, tab. 129 et ed. 2, tab. 25; Rchb., Ic. Fl. Germ. f. 4166; Schulz in E.-Pr. Nat. Pflzf. B. 17b (1936), 356, f. 194. – Exs.: Fl. Exs. Austro-Hung. No. 2057.

Perennial; root long, 60–120 cm, fusiform, subcylindrical, 2–2.5 cm in diameter, brownish black outside, with white fleshy pith inside; entire plant glaucous; stems solitary or several, erect, 30–40(–90) cm high, angular, branching from base, dispersely covered up to pedicels with short rigid hairs when young, becoming glabrous as pubescence disappearing with age; leaves fleshy, grayish green, first ones small, entire, the proceeding leaves multifid, together with stem densely covered when young, and especially beneath, with rigid hairs, later sparsely so; radical leaves large, deeply and irregularly bipinnatipartite, with oblong-linear, remotely dentate or incised, obtuse lobes, petioles 2–6 cm long, hispid; upper leaves distinctly smaller, very short-petioled (1–2 cm) or subsessile, more or less oblong, simple, irregularly sinuate or shortly pinnatilobate, with narrow lobes; the uppermost leaves small, linear, entire, 0.5–1 cm long. Inflorescence strongly paniculate, branches short but later elongating, 10–20-flowered; flowers 4 mm long, 3 mm broad, with honey aroma; sepals 2–3 mm long, the outer widely oblong, the inner widely ovate, rounded at apex, seldom slightly hairy and violet above; petals twice as long as sepals, 4.5–5.5 mm, white, blade broadly oblong-elliptic, subtruncate at apex, abruptly short-clawed; stamens
485 often violet; pedicels 7–10(18) cm [sic ?] long, ascending-erect or slightly curved; upper silicle joint subglobose, 4–5 mm across, tetragonous, netted-rugose (veined), woody, dull yellowish. Fl. April–May, Fr. June–July.

Steppes, chalky slopes, rocky-calcareous, clayey hills. – European part: M. Dnp., Bl., L.-Don, L. V., Transv., Crim.; Caucasus: Cisc., Dag.; W. Siberia:

U. Tob. **Gen. distr.**: southern Europe. Described from Hungary. Type in Vienna.

Economic importance. Entire plant edible. The root decoction is regarded as a tonic for children.

9. **C. grandiflora** DC., Syst. II (1821) 652; Ldb., Fl. Ross. I (1842) 222; Shmal'g., Fl. I (1895) 83; N. Busch in Fl. cauc. crit. III, 4 (1908) 305; Schulz, l. c., 235.

Perennial; entire plant glaucous; stem 60–100 cm high, glabrous; leaves glabrous, with rigid cilia only along veins and margin; radical leaves ovate, deeply 1–2-pinnatipartite, with oblong or lanceolate, strongly sinuate-dentate to acutely pinnatipartite lobes; cauline leaves oblong, incised-dentate, the upper sublinear, entire. Inflorescence branching, racemes elongated; sepals 3.5–4 mm long; petals 5.5–6–7 mm long, obovate; fruiting pedicels ascending-erect, 15–18 mm long; fruits tetragonous, ovoid, 7–8 mm long, 6–7 mm broad, netted-veined, the young tapering at apex. Fl. April–May, Fr. June.

Steppes. – European part: Crim.; Caucasus: Cisc. Endemic. Described from Taman Peninsula, at the estuary of Kuban. Type in Leningrad.

10. **C. steveniana** Rupr., Fl. Cauc. (1869) 136 in textu; N. Busch, Fl. cauc. crit. III, 4 (1909) 306, p. p. – C. pinnatifida Stev. in Bull. Soc. Nat. Mosc., XXIX (1856) 290, non DC.

Perennial, completely glabrous, glaucous; stem 60–100 cm high; radical leaves pinnatipartite, 18–30 cm long, 14–30 cm broad, with broad, irregularly dentate lobes, [or] bipinnatipartite, with narrow, acute lobes; petioles 6–19 cm long; upper leaves oblong-lanceolate, entire or somewhat sharply toothed. Inflorescence loose, strongly branching, spreading; sepals 2–3 mm long, ca. 2 mm broad, obtuse; petals obovate, 5–5.5 mm long, ca. 4 mm broad, cuneate at base; filaments with thin long teeth; fruiting pedicels ascending-erect, up to 10–12 mm long; fruit tetragonous, subglobose, 6–7 mm long, 5–6 mm broad, netted, mature fruit brown, with a slightly prominent beak. Fl. May–June, Fr. July.

486 Clayey steppical slopes. – European part: Bl., Crim.; Caucasus: Transc. Described from the Caucasus and the Crimea. Type in Leningrad.

Note. Var. oxycarpa Rupr., with fruit acuminate at both ends, is distinguished within the range of this species.

11. **C. edentula** Fisch. et Mey. ex Karelin in Bull. Soc. Nat. Mosc. (1839) 145, No. 102 (nomen); Korsh. in Bull. Acad. Pétersb. V, Sér. IX, 5 (1898) 421–422 diagn. (excl. specim. Becker); Schulz in Engl. Pflzr., Heft, 70 (1919) 237; Chernyak. in Izv. Gl. Bot. Sada XXVIII, 3–4 (1929), 395–397.

Perennial; root thin, woody; stems one or several, 45–55 cm high, glabrous, ribbed, branching, leafy below, nearly leafless above; leaves cordate-ovate, 4–12 cm long and broad, somewhat cordate or truncate at base, together with petioles (1.5–6 cm long) rigid-hairy, particularly beneath along veins and margin, angularly dentate or subentire; upper cauline leaves linear-subulate, small. Inflorescence loose, branching, branches elongated; sepals oblong, up to 3 mm long, glabrous; petals white, 5–7 mm long, oblong-ovate, tapering at base, the upper 2.5–3 mm broad; all filaments edentate, the longer slightly dilated at both sides; fruiting pedicels up to 7 mm long, erect; upper joint of silicle up to 2 mm long, elliptic, firm, smooth, glaucous. April–May.

Mountain slopes, stony taluses, cliff crevices, fissures in Sarmatian platform, chalk and limestones. – Centr. Asia: Kara K., Kyz. K., Mtn. Turkm. Endemic. Described from Turkmenia, from the shores of the Caspian Sea. Type in Leningrad.

Note. The Balkhan specimens are somewhat distinguished from the type by their coarse, broadly oval leaves covered on both sides with rigid hairs, and by later flowering (var. balchanica Czerniak.). C. juncea var. glabrata described by Freyn, which has nothing in common with C. juncea M. B., as noted by N. A. Busch (N. Busch, Cruciferae Asiat. novae in Monit. Jard. Bot. Tiflis, 1927, livr. 3–4, p. 7–8), should be referred to the group of forms of C. edentula. C. juncea var. glabrata may be separated as var. freynii Czerniak because of its coarse, suborbicular, obtuse, fleshy, glabrous and glaucous leaves and the much larger flowers. (C. juncea var. glabrata Freyn et Sint. in Bull. Herb. Boiss., 2 Ser. III, 10 (1903) 857. Exs.: Frey et Sint. No. 1581).

Section 2. **LEPTOCRAMBE** DC., Syst. II (1821) 650, 655. – Lower joint of silicle thin, subcylindrical. Branches very thin. Filaments dentate or edentate. Silicles smooth, globose, minute.

12. **C. armena** N. Busch in Monit. Jard. Bot. Tiflis. Nouv. Sér. 3–4 (1927) 7–8. – Ic.: N. Busch, l. c., 9, f. IV.

487 Perennial, entirely glabrous; taproot rather stout, branching, woody; stem ca. 60 cm high, thin, leafy; radical leaves ca. 7 cm long, 4 cm broad, obovate, coarsely eroded-lobate, with 2–2.5 cm long petioles, cauline leaves oblong, eroded-dentate, short-petioled. Sepals ca. 2 mm long; petals 3.75–4 mm long, white, broadly elliptic, short-clawed; longer filaments with curved teeth; young fruit small, globose, up to 2 mm across. May.

Solonetzic places. – Caucasus: S. Transc. Endemic. Described from Nakhichevan, near the salt mines. Type in Leningrad.

Note. This species is related to C. juncea from which it is distinguished by the absence of hairs, shape of leaves and petals (petals neither rounded nor long-clawed as is the case in C. juncea M. B., but broadly elliptic, short-clawed).

13. **C. koktebelica** (Junge) N. Busch in Fl. cauc. crit. III, 4 (1908) 296 et in Acta H. Bot. Jurjev. X (1909) 1–7. – C. juncea var. koktebelica Junge in Tr. SPb. O. E. XXXV, I, Report of meeting (1904) No. 6, 395. – C. orientalis var. koktebelica Schulz, l. c., 239. – Ic.: N. Busch in A. H. Jurjev. X (1909) 1 et 3.

Perennial; stems very tall, 1.5–2.5 m, strongly branching, together with petioles densely covered at base with long, white retrorse hairs; leaves lyrate or pinnatisect, with dentate lobes, sometimes entire and rounded;

radical leaves large, 20–29 cm long, 9–18 cm broad, petioles 1–10 cm long; all leaves glabrescent above, sparsely long-hairy below along veins, or entirely glabrous, sometimes pilose on both sides; sepals brightly golden, 2–2.5 mm long; petals white, 4–6.5 mm long; longer filaments dentate; lower joint of silicle subcylindrical, 0.5–1 mm long, the upper joint globose or subgloblose, smooth, obscurely nerved, 4–4.5 mm long, 3–4.5 mm broad. Fl. April–May, Fr. June.

Clayey-calcareous sea bluffs (Azov and Black seas). – European part: Crim.; Caucasus: Cisc. (Anapa). Endemic. Described from the Crimea. Type in Leningrad.

Note. C. koktebelica varies in shape of leaves, from subentire to lyrate, and in pubescence. It is twice as high as C. juncea, its flowers are 1.5–2 times larger, and its sepals are a bright yellow.

Economic importance. Might be cultivated as an ornamental plant.

14. **C. juncea** M. B., Fl. taur.-cauc. III (1819) 421; Ldb., Fl. Ross. I 223; N. Busch in Fl. cauc. crit. III, 4 (1908) 298. – C. orientalis var. juncea Schulz in Engl. Pflzr., Heft. 70 (1919) 238. – Exs.: Kotschy Pl. Pers. bor. (1846) No. 69.

488 Perennial; stems 30–70 cm high, thin, smooth, glabrous above, leafy beneath, covered – like petioles – with long, rigid, retrorse hairs only at base; leaves ovate-elliptic, irregularly sinuate-dentate or lyrate-pinnatipartite, lobes dentate, 4–30 cm long, 2–20 cm broad, petiole 3.5–9 cm long, sparsely pubescent above and mainly below, with long, coarse hairs along veins. Inflorescence branching, elongated, with very thin branches, leafless; sepals 1.5–2 mm long; petals 3–5 mm long; fruiting pedicels up to 4–5 mm long, somewhat spreading; lower joint of silicle cylindrical, 0.5–1 mm long, the upper joint globose, smooth, 3–4 mm across. Fl. May–July, Fr. from June.

Hills, dry slopes and rocks, 300–1,300 m. – Caucasus: E. Transc. **Gen. distr.**: Iran. Described from the Caucasus (Tbilisi). Type in Leningrad.

Note. This species differs from C. orientalis by the following characters: smaller in stature, leaves small, less divided, long hirsute along veins; flowers smaller, petals larger; inflorescence more loose.

15. **C. aculeolata** (N. Busch) E. Czerniak., sp. nova in Addenda VII, p. 488.– C. juncea Trautv. in A. H. P. II (1873) 504, non M. B. – C. juncea var. aculeolata N. Busch in Fl. cauc. crit. III, 4 (1908) 299. – C. orientalis var. juncea f. aculeolata O. Schulz in Engl. Pflzr. 70 Heft, 239. – Exs.: Bornm., Iter Pers. alt. No. 6303.

Perennial; stem erect, 45–65 cm high, cylindrical, branching nearly from base, with firm, retrorse prickles scattered throughout; leaves covering entire stem, glaucous, shortly appressed-hairy, lower leaves oblong-ovate, 15–30 cm long, short-petioled, lyrate-pinnatilobate, irregularly toothed, middle cauline leaves ovate-rhombic, irregularly sinuate, cuneate at base, upper leaves subentire, lanceolate, all acutely serrate at margin; the uppermost leaves lanceolate-subulate, gradually reduced to hardly visible subulate leaves at apical part of branches; petioles, as well as veins in lower part of blade, with acute, retrorse, prickly hairs, together with short, coarse ones. Inflorescence a pyramidal panicle, hispid at apices; flowers white; sepals ca. 3 mm long, rounded at apex, membranous at margin; petals oblong-obovate, 4.5 mm long; filaments of longer stamens long, minutely-toothed; ovary oval. May–June.

Caucasus: S. Transc. (Nakhichevan ASSR). **Gen. distr.**: N. Iran. Described from the Caucasus and Iran. Type in Leningrad.

Note. Trautvetter, having in the herbarium the inflorescences of C. aculeolata without the radical leaves (collected by Radde in the 489 Caucasus in 1871), referred it with some reservation to C. juncea M. B. The inflorescences are unusually typical, with their pyramidal shape, and the hamate hairs on stem, petioles and nerves. In 1830, Hohenacker collected the plant near the village of Zuvand in Talysh and referred it to C. orientalis. N. A. Bush (l. c.) described it as var. aculeolata N. Busch. In the USSR there is material from Iran which adds to our knowledge on this taxon and sustains our treating it as an independent, well-distinguished species which is rather broadly distributed in the Elburz Mountains of northern Iran. In addition to the preceding characters, C. aculeolata is easily distinguished from C. juncea by the foliage of the plant which extends to the very summit of the inflorescence.

16. **C. orientalis** L., Sp. pl. ed. I (1753) 671; Ldb., Fl. Ross. I (1842) 22, 771; Shmal'g., Fl. I (1895) 83; N. Busch in Fl. cauc. crit. III, 4 (1908) 299. – Ic.: Jaub. et Sp., Ill. Fl. Or. V (1853–1857) tab. 433. – Exs.: Sint., Ir. Or. (1894) No. 6145.

Perennial; stem 30–80 cm high, smooth, angular below, glabrous; leaves large, ovate to oblong, 14–30 cm long, 8–26 cm broad, leaves and petioles densely covered on both sides with short, coarse, appressed hairs, petioles 3–20 cm long; lower leaves entire, the rest irregularly pinnatilobate or lyrate. Inflorescence loose, leafless, branching, with thin branches; sepals 2–2.5 mm long, petals 4–5 mm long; fruiting pedicels 4–6 mm long; lower joint of silicle oblong, short, upper joint subglobose, smooth, slightly 4-ribbed, 3–4 mm across. Fl. May, Fr. June–July.

Fields, hills, dry slopes, rocks, stony taluses, clayey places. – Caucasus: W., E., and S. Transc., Tal. **Gen. distr.**: As. Min., Arm.-Kurd., Iran. Described from the East. Type in London.

Note. "C. orientalis" (Fergana) reported for Central Asia by O. A. and B. A. Fedchenko (Consp., Fl. turk. I (1906) 92, No. 483) is unquestionably C. schugnana Korsch.

Economic importance. The leaves and young stems are stripped and eaten raw; they contain antiscorbutic substances.

17. **C. gordjagini** Spryg. et Pop. in Pochv. i bot.-geogr. nabl. v bass. Amu-Dar'i i Syr-Dar'i, II (1916); Korov. Kul't. i Pop., Opisanie nov. r. Turk. Add., 87.

Perennial; root woody, stems several, up to 60 cm high, branching from base, glabrous or sparsely long and coarse-hairy only near base; lower cauline leaves lyrate, with lower lobes 1–2, minute, and large terminal lobe, ovate or oblong, irregularly sinuate, obtuse, petioles long, scabrous; 490 upper leaves somewhat reduced, oblong, without minute lower lobes, petiolate, lobate or entire, the uppermost leaves only in lower part of inflorescence, small, linear, entire; all leaves, except for the uppermost, densely long-scabrous beneath, glabrescent above. Inflorescence virgately paniculate, strongly branching, branches thin, elongate, ascending-erect; pedicels almost as long as flowers, thin, glabrous; sepals oblong, obtuse, 3–5 mm long, white-margined; petals bright yellow, oblong, obtuse, 6 mm long; longer stamens marginate at base, with small teeth on both sides; stigma sessile; fruiting pedicels short, 6–7 mm long, appressed to rachis; upper joint of silicle tiny, subellipsoidal, smooth, shiny, 3 mm long, 2 mm broad, subobtuse, Fl. April, Fr. May.

Tertiary saline sandstones. – Centr. Asia: Pam.-Al. Endemic. Described from Bukhara, from the low mountains bordering the Kyzyryk-Dar steppe in the north. Type in Tashkent, cotype in Leningrad.

Note. This specimen was already reported by A. Regel but remained undetermined for a long time in the herbarium.

18. **C. schugnana** Korsh, in Bull. Acad. Sc. Pétersb. V, Sér. IX (1898) 422; O. et B. Fedtsch., Consp. I (1906) 92, No. 482; Schulz in Engl. Pflzr., 240. – C. darwasica f. nova (an sp.) Korsh., l. c., 423. – C. orientalis O. et B. Fedtsch. in Consp. I (1906) 92.

Perennial; root cylindrical, woody, branching above; stem 75–100 cm high, covered below with straight, coarse hairs, partly grouped on tubercles (resembling stellate hairs), leafy at base, leafless above; leaves thick, coarse, covered on both sides with similar hairs, lyrate, with or without 1–3 small, oblong or linear-oblong lobules at base, the leaves oblong or elliptic or ovate-oblong, truncate or cuneately tapering at base, with petioles 15–33 cm long, blade 8–14(23) cm long, 4–8(17) mm [?] broad, wavy, sinuate-lobate or entire, irregularly dentate to subentire. Inflorescence large, loose, branching; sepals oblong, with remote, coarse, erect bristles; petals obovate, twice as long as sepals, 6 mm long, 3 mm broad, tapering into a claw; filaments of longer stamens dentate; fruiting pedicels thin, 4–6 mm long, suberect; upper joint of silicle small, short-ellipsoidal, 2.5 mm long, 2 mm broad, finely tetragonous, smooth; seeds compressed-globose, 1.5 mm across, light brown, wrinkled. Fl. July, Fr. July–August.

Stony mountain slopes, 2,300–2,700 m. – Centr. Asia: Pam.-Al. Endemic. Described from Shugnan, from between the towns of Mendyshar and Khorog. Type in Leningrad.

491 Note. In a comparison of the Shugnan plants with the Darvaz, separated by Korzhinskii as f. darvasica, I find no significant difference between them: the occurrence of lobes at the base of leaves in the Shugnan plants is not constant, for which reason I find it more convenient not to divide these two extremely similar forms, as S. I. Korzhinskii himself has indicated.

Genus 656. **CALEPINA**[*] ADANS.[**]

Adans., Fam.d.pl. II (1763) 423.

Sepals spreading, not saccate. Petals small, white. Filaments entire, free. A squamose nectariferous gland on inner side of the shorter stamens, slightly concave outside; an oblong gland in front of each pair of the longer stamens. Ovary sessile. Style very short. Fruit ovoid or obpyriform, indehiscent; seed one, pendulous; embryo with conduplicate cotyledons. — Annual, glabrous, with entire leaves. A monotypic genus.

1. **C. irregularis** (Asso) Thell. in Hegi, Illustr. Fl. Mitt. Eur. IV, I (1916) 189. — C. corvini Desv., Journ. Bot. III (1814) 158; DC., Syst. II (1821) 648 et Prodr. I (1824) 225; Ldb., Fl. Ross. I (1842) 221; Boiss., Fl. Or. I (1867) 409; Shmal'g., Fl. I (1895) 105; N. Busch in Fl. cauc. crit. III, 4 (1908) 233; Myagrum irregulare Asso, Syn. stirp. Arag. (1779) 82. — Ic.: Rchb., Ic. Fl. germ. f. 4163. — Exs.: Rchb., Fl. exs. No. 361.

Annual, 20—30 (50) cm high; stem branching from base; leaves more or less sinuate-dentate, the radical leaves oblong, usually lyrate-pinnatipartite, long-petioled, cauline leaves oblong-lanceolate, sessile, sagittate, semi-amplexicaul. Flowers in racemes; sepals spreading, lanceolate or elliptic, ca. 1—1.5 mm long; petals white, 1.5—2 times longer than sepals, oblong-obovate, slightly unequal (hence the species name); silicles 2.5—3 mm long, with 4 thin, longitudinal ribs and many thin-walled, transverse cells, terminating at apex in a conical, compressed, longitudinally rugose beak, 2—3 mm long; pedicels 6—10 (15) mm long, arcuately ascending. April. (Plate XIX, Figure 6).

Steppes, slopes, often growing as a weed. — European part: Crim.; Caucasus: Cisc., E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm., Kara K. **Gen. distr.:** Atl. Eur., Centr. Eur., Med., Bal.-As. Min., Iran. Described from Central Europe.

492 Genus 657. **RAPHANUS**[†] L.[††]

L., Sp.pl.ed.I (1753) 669.

Sepals erect, oblong, obtuse, the lateral slightly saccate. Petals broadly obovate, long-clawed, yellow, white or purple-violet. Filaments edentate. A large nectariferous gland on inner side of the shorter stamens, concave outside; a small, cylindrical, sometimes rudimentary, nectariferous gland in front of each pair of the longer stamens. Ovary borne on very short gynophore, style obscure, stigma capitate, small, hardly 2-lobed. Fruit indehiscent, cylindrical, 2-jointed, the upper joint few-seeded, in some species breaking into single-seeded portions, tapering into a more or less long beak. Seeds ovate-spherical; radicle lying in groove between longitudinally conduplicate cotyledons. Hairs simple. — Annuals or perennials, with pinnate leaves.

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[*] From Aleppo, a town in Syria.

[**] Treatment by I.T. Vasil'chenko.

[†] The name of radish in Theophrastus, from the Greek ra — quickly, lightly and faino — display, ascend.

[††] Treatment by E.N. Sinskaya, with additions by editors.

Economic importance. Radish yields many cultivated varieties, one of which is R. sativus var. radicula Pers. Different kinds of radish are distinguished by the shape of root — globose, ovoid, short or long — and by the color. It is one of the earliest vegetables to appear in season. Because of its rapid growth it can be cultivated in the Far North. It is even grown on Spitzbergen.

1. Siliques soft, spongy inside, aseptate, not constricted outside, at maturity not breaking in joints but in irregular parts, mostly lengthwise. Flowers white or purple-violet . . . . 1. **R. sativus** L.
+ Siliques hard, with or almost without constrictions outside, breaking at maturity in separate joints or, if not then joints break transversely . . . . 2.
2. Siliques rather stout, 5—8 mm across at maturity, obscurely constricted outside. Lateral lobes of lower leaves rather close to each other. Flowers usually yellow, rarely white . . . . 2. **R. maritimus** Smith.
+ Siliques thinner, distinctly constricted, at maturity often breaking in
493 joints . . . . 3.
3. Petals light violet. Beaks long, longer, or slightly shorter than half of silique, root thin . . . . 3. **R. rostratus** DC.
+ Petals white or yellow, if violet, then roots stout. Beaks much shorter . . . . 4.
4. Leaves large, with numerous lateral lobes (up to 15 pairs); roots white, stout, very large . . . . 4. **R. raphanistroides** (Makino) Sinsk.
+ Leaves lyrate, lateral lobes 2—6-paired; root thin, annual . . . . 5. **R. raphanistrum** L.

1. **R. sativus** L., Sp. pl. ed. 1 (1753) 669; Sinskaya, Maslich. i kornepl. sem. Cruciferae (1928) 448 and in Tr. Prikl. Bot., Gen. i Sel. 26 (1931) 1.*

Annual or biennial; root thickened, edible, annual (red radish) or biennial (white radish), rarely thin (Chinese radish), red, white, violet, pink, black; lower leaves lyrate-pinnatifid, with large terminal lobe, lateral lobes 2—6-paired, rarely leaves subentire. Petals white, pink, or violet; siliques broad, slightly inflated, glabrous or hirsute, soft at base, spongy inside, obscurely concave above but not jointed, breaking in irregular portions, mostly longitudinally; beak generally stout, usually half as long as silique.

Grown everywhere where kitchen gardens are cultivated. The thin rooted form (Chinese radish) is very rare in western Europe. Unknown in its wild state. **Gen. distr.:** cultivated in all parts of Europe, in the temperate zones of Asia and N. America and Australia. Originated on the shores of the Mediterranean.

2. **R. maritimus** Smith in Sowerby, Engl. Bot. XXIII (1806) tab. 1643; DC., Syst. II (1821) 668. — Rhaphanistrum odessanum Ldb., Fl. Ross. I (1842) 224. — Rhaphanus odessanus Spreng., Syst. Veg. II (1825) 855; N. Busch in Fl. cauc. crit. III, 4 (1908) 287. — R. raphanistrum ssp. odessanus Shmal'g., Fl. I (1895) 81.

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* A more precise diagnosis is reported in this work in order to make it easier to distinguish this species from the Indian and Japanese.

Biennial or perennial (triennial); root thickened, white, succulent; stem up to 150 cm high, scabrous beneath, usually glabrous in upper part; lower leaves lyrate-pinnatisect, lateral lobes 5–9-paired; all leaves slightly fleshy, scabrous with sparse, coarse hairs; petals yellow, rarely white; siliques up to 9-seeded (sometimes 1–2), 2–5 cm long, abruptly ending in a
494 2 cm long beak, often shorter, hard, obscurely constricted outside, somewhat spongy inside, obsoletely celled; breaking transversally in 1-seeded joints; seeds grayish brown. April–May.

Seacoasts. — European part: shores of the Black Sea, Bl. (Odessa), Crim.; Caucasus: shores of the Black Sea. **Gen. distr.**: shores of the Mediterranean and the Atlantic Ocean. Described from Great Britain. Type in London.

Economic importance. Seeds sometimes used as a substitute for mustard.

3. **R. rostratus** DC., Syst. II (1821) 666; N. Busch in Fl. cauc. crit. III, 4 (1908) 286. — Rhaphanistrum rostratum Fisch. et Mey., Ind. sem. H. P. IV (1838) 22; Ldb., Fl. Ross. I (1842) 224, 771.

Annual; stem 12–80 cm high, hirsute; lower leaves lyrate-pinnatisect, hirsute, lateral lobes 3–4-paired. Sepals 9–11 mm long; petals pale violet, 17–24 mm long; fruiting pedicels ascending, 12–20 mm long; siliques 3–10 cm long, 6 mm broad, glabrous, green or violet, distinctly constricted, tapering into a long, conical-subulate 2 cm long beak, more or less hirsute; seed cells sometimes remote from each other. April–May.

Seacoasts and solonetzic places along the Caspian Sea. — Caucasus: Tal., Dag. ? Endemic. Described from Talysh. Type in Geneva.

4. **R. raphanistroides** (Makino) Sinsk. in Tr. Prikl. Bot., Gen. i Sel. 26 (1931) 1. — R. sativus f. raphanistroides Makino in Bot. Mag. Tokyo XXIII, No. 267 (1905) 70.

Annual or biennial, winter plant; root white, edible, very large; lower leaves hirsute, lyrate-pinnate, lateral lobes up to 15–20-paired. Petals large, violet; siliques glabrous, more or less constricted, hard, breaking in separate joints at maturity, beak one-half to one-third as long as silique.

Cultivated in small measure on the Black Sea coast of the Caucasus and in the Ussuri Territory. A new plant. **Gen. distr.**: Japan, E. China. Native to East Asia, where its wild form with thin roots grows along the seacoast.

5. **R. raphanistrum** L., Sp. pl. ed. I (1753) 669; N. Busch in Fl. cauc. crit. III, 4 (1908) 287. — Rhaphanistrum innocuum Ldb., Fl. Ross. I (1842) 225. — Raphanus raphanistrum ssp. arvensis Shmal'g., Fl. I (1895) 81.

Annual; stem 20–70 cm high, often flexuous, densely covered with coarse hairs at base, sparsely so above; lower leaves lyrate-pinnatisect, lateral lobes 4–6-paired, all leaves hirsute. Petals yellow, rarely white or with a
495 violet tinge; siliques 3–8 cm long, 3–4 mm broad, hard, breaking in separate 1-seeded joints at maturity; beak 1–2 cm long.

Growing as a weed in crops. — European part: everywhere except for the Arctic, more common in the west and nonchernozem belt, L. V., rare; Caucasus: Cisc., S. Transc., very rare; Siberia and Far East: very rare in farming areas. **Gen. distr.**: Europe, except for N. Scand., As. Min., Syria. Introduced into North America. Described from Europe. Type in London.

Genus 658. **CONRINGIA** * (HEIST.) PERS.**

Heist.ex.L., Syst.ed.I (1735); Pers., Synops.II (1807) 206; N.Busch in Fl.cauc.crit.III, 4 (1910) 699; Hayek, Crucif.-Syst. (1911) 280.— Conringia Adans., Fam.II (1763) 418.

Sepals erect, the lateral saccate at base. Petals long-clawed, pale yellow, sometimes red-veined. Filaments free. A crescent-shaped, outwardly open nectariferous gland at base or a small gland at both sides of base of the shorter stamens. Ovary sessile. Style short. Stigma obtuse, not 2-lobed or obscurely 2-lobed. Fruit a bivalvular silique, cylindrical, tetragonous or octagonal, rarely flattened, elongate. Valves flat or convex, with midrib, sometimes also with 2 lateral nerves. Septum fiberless, epidermal cells transversely elongated and parallel to each other. Seeds globular, uniseriate. Cotyledons flat or slightly concave toward radicle. Embryo notorrhizal, rarely pleurorhizal. Hairs absent. — Glabrous, often glaucous plant, with entire amplexicaul leaves.

A Near Asian and Central Asian genus of 6 species, 4 of which are represented in the USSR.

1. Small plant, with tiny flowers (petals 3.5—4 mm long) . . . . 3. **C. persica** Boiss.
+ Taller plant, with larger flowers (petals 6—13 mm long) . . . . 2.
2. Each valve distinctly 3-nerved . . . . . . 2. **C. austriaca** (Jacq.) Sweet.
+ Siliques with a midrib or nerveless . . . . 3.
3. Style thickened, clavate, broader than silique and longer than width of silique . . . . 4. **C. perfoliata** (C. A. M.) N. Busch.
496 + Style not thickened . . . . 4.
4. Siliques tetragonous, not torulose; valves hardly keeled, with a stout midrib . . . . 1. **C. orientalis** (L.) Andrz.
+ Siliques flattened, torulose; valves without midrib, thickened at margins . . . . 5. **C. planisiliqua** F. et M.

1. **C. orientalis** (L.) Andrz. in DC., Syst. II (1821) 508; N. Busch in Fl. cauc. crit. III, 4 (1910) 700; Kryl., Fl. Zap. Sib. VI (1931) 1396. — Brassica orientalis L., Sp. pl. (1753) 666. — Erysimum orientale Ldb., Fl. Ross. I (1842) 192; Shmal'g., Fl. I, 70. — Ic.: Fl. Austr. tab. 282; Rchb., Ic. Fl. Germ. tab. LXI, f. 4382. — Exs.: Rchb., Fl. Germ. exs. No. 789.

Annual; stem 18—72 cm high; leaves oblong-elliptic; sepals 5.5—7 mm long; petals veinless, 9—13 mm long; fruiting pedicels spreading, 6—20 mm long; siliques ascending or spreading, tetragonous, 5—12 cm long, 2—3 mm thick; style 0.75—3, rarely 4 mm long, acuminate, subulate; stigma minute, capitate, emarginate; valves slightly keeled, with a strong midrib; seeds brown, scabrous, 2.5—2.75 mm long, 1.25—1.75 mm broad; cotyledons deeply sulcate at both sides of radicle. April—May.

Seacoast sands, fields, fallow fields, roadsides, weedy places, up to 2,200 m. — European part: M. Dnp., V.-Don, Bl., L. Don, V.-Kama, Transv., L. V., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Amu D., Mtn. Turkm. **Gen. distr.:** Centr. Eur., Bal.-As. Min., Syria, Arm.-Kurd., N. Iran. Described from Europe. Type in London.

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* After Herman Conring, professor of medicine.

** Treatment by N.A. Bush.

Economic importance. In the Caucasus, the young sprouts are eaten with salt, vinegar, onion, and butter. Seeds contain fatty oil.

2. **C. austriaca** (Jacq.) Sweet, Hort. Brit. ed. I (1827) 25; Rchb., Fl. Germ. (1833) 686; N. Busch in Fl. cauc. crit. III, 4 (1910) 703.— Brassica austriaca Jacq., Fl. Austr. III (1775) 45 tab. 283.— Erysimum austriacum Ldb., Fl. Ross. I (1842) 192; Shmal'g. Fl. I, 70.— Ic.: Rchb., Ic. Fl. Germ. tab. LXI, f. 4381.

Annual; stem 30—60 cm high; leaves ovate. Sepals 5—6 mm long; petals 9—10 mm long; fruiting pedicels erect, 2.5—9 mm long; siliques erect, subtetragonous, 5.5—9.5 cm long, 2—3 mm broad; style subulate, 1—4 mm long; stigma minute, capitate; valves slightly keeled, strongly 3-nerved, lateral nerves reticulate; seeds dark brown, scabrous, oblong, 2.5—3 mm long, 1—1.75 mm broad, one of the cotyledons slightly sulcate at margin. April—May.

497 Dry meadows, hills, fields, roadsides, scattered.— Caucasus: Cisc. (Pyatigorsk area), W., E., and S. Transc., Tal. **Gen. distr.**: Centr. Eur., Bal.-As. Min. Described from Austria. Type in Vienna.

3. **C. persica** Boiss., Diagn. Sér. I, 6 (1845) 12; Fl. Or. I (1867) 210; Schulz in Pflzr. IV, 105 (1923) 90.

Annual, low plants, 4—25 cm high; stem simple or branching from base, often lilac-colored; lowermost leaves obovate, cuneately tapering to base, cauline leaves ovate, cordate-amplexicaul at base. Racemes 3—15-flowered; flowers small; sepals 2 mm long, oblong, hyaline at margin; petals pale yellow, 3.5—4 mm long, obcuneate, slightly sinuate at apex; pedicels ascending, 2—4 mm long; siliques linear, 2.8—4.2 cm long, flattened, 1 mm broad, stigma small, flattened-capitate, valves with a distinct midrib and lateral netted veins; seeds pale brown, smooth, oblong, 1.2 mm long, 0.5 mm broad. April—May.

Stony places.— Caucasus: Tal. (Kosmalyan, Diagu Mountain). **Gen. distr.**: Arm.-Kurd., Iran., Afghanistan. Described from Iran (Elburz, Shiraz, between Khabbis and Kerman), Type in Geneva.

4. **C. perfoliata** (C. A. M.) N. Busch, comb. nova.— C. clavata Boiss. in Ann. Sc. Nat. Sér. 2, XVII (1842) 84; N. Busch in Fl. cauc. crit. III, 4 (1908) 705.— Sisymbrium perfoliatum C. A. M. Verz. d. Pflz. Cauc. (1831) 188; Ldb., Fl. Ross. I (1842) 178.— Ic.: Schulz Brassiceae in Engl. Pflzr. (1923) 91 et in Pflzfam. 17b (1936) 396.

Annual; stem 9—30 cm high; leaves orbicular-elliptic. Sepals 5—7 mm long; petals 9—11.5 mm long; fruiting pedicels ascending, 2—5 mm long; siliques ascending, cylindrical, 40—77 mm long, 1—1.5 mm broad; style clavate, thickened, 2—5 mm long; stigma bifid with convergent lobes; valves convex, obscurely 1-nerved, irregularly small-veined; seeds rufous or dark yellow, oblong, rather smooth, 1.75 mm long, 0.7—0.9 mm broad. April—May.

Dry steppes, stony places, fields.— Caucasus: Tal.; Centr. Asia: Mtn. Turkm., Amu D. **Gen. distr.**: As. Min., Syria, Arm.-Kurd., N. Iran, Afghanistan. Described from Talysh near the village of Zuvand, 1,200 m. Type in Leningrad.

5. **C. planisiliqua** Fisch. et Mey., Ind. III sem. Hort. Petropol. (1837) 32; N. Busch in Fl. cauc. crit. III, 4 (1910) 706; Kryl., Fl. Zap. Sib. VI (1931) 1395.— Erysimum planisiliquum Steud., Nom. ed. I (1840) 594; Ldb., Fl. Ross. I (1842) 192, 762.

Annual; stem 20—70 cm high; leaves oblong. Sepals 3.5—4 mm long; petals 6—7 mm long, red-veined or straw-colored (var. ochroleuca
498 Schrenk in F. et M.); fruiting pedicels erect, thin, 3—12 mm long; siliques erect, flattened, torulose, thin, 5—9.5 mm long, 1.3—1.75 mm broad; style thin, cylindrical, 1—3 mm long, stigma minute, capitate; valves nerveless, thickened at margin; seeds rufous, oblong, 1.5—2 mm long, 0.5—1 mm broad; cotyledons slightly folded. April—May.

Clayey slopes and in fields.— Caucasus: E. Transc. (Tbilisi), S. Transc.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Amu D., T. Sh. **Gen. distr.**: Arm.-Kurd., Iran., Dzu.-Kash., Tib. Described from Talysh, from the dry steppes near Zuvand village, 1,150 m. Type in Leningrad.

Genus 659. **SPRYGINIA** * M. POP.**

M.Pop. in Tr.Turk.N. Obsch. I (1923) 35.

Sepals erect, the lateral saccate at base. Petals long-clawed, pinkish purple; stamens edentate, filaments of the longer stamens connate in pairs, anthers with 1 fully developed cell, the other cell reduced. A nectariferous gland inside base of the shorter stamens oblate or crescent-shaped, concave outside. Ovary sessile. Fruit a bivalvular, linear silique with valves not reaching apex, flat, midrib distinct only in lower part. Septum with a narrow strand, thin, epidermal cells transversely elongated; style short, stigma conical-cylindrical, 2-lobed. Seeds uniseriate, flattened, wingless or winged. Cotyledons flat; embryo semipleurorhizal. Glabrous annual with entire leaves.

A monotypic genus, endemic in Central Asia.

1. **S. winkleri** M. Pop. in Tr. Turk. Nauch. O-va., I (1923) 35.— Moricandia winkleri Rgl. in A. H. P. IX, 2 (1886) 612.— Orychophragmus winkleri O. E. Schulz in Nat. Pflzf. Band 17b (1936) 391 et fig. 221.

Annual, glabrous, 14—15 cm high; stem simple or branching; leaves entire, all petiolate; cauline leaves oblong-lanceolate or oblong-elliptic or broadly oval, acute (or the lowermost obtuse), subentire or sinuate or dentate. Calyx narrowly tubular, colored; sepals linear-oblong, obtuse, nearly always white-hyaline at apex, ca. 1 cm long; petals pinkish purple, more than twice as long as calyx, 20—26 mm long, claw distinctly longer than calyx, blade obovate, obtuse, not notched; fruiting pedicels thin, 5—7 mm long; siliques linear, flattened, 8—12 cm long, torulose, usually arcuate, style conical-cylindrical, ca. 3 mm long; seeds oval-oblong, 2—2.5 mm long, 1—1.5 mm broad. April—May.

499 Solonetzic hills, 800—1,600 m.— Centr. Asia: Amu D., Pam.-Al. (Bukhara), Kyz. K. Described from eastern Bukhara, from the Tash-Bulak Mountains

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* After I.I. Sprygin, the noted Soviet botanist.

** Treatment by N.A. Bush.

on the left side of the Kafirnagan River, 1,400–1,650 m, near Baldzhuan, 800–1,140 m, near Sayat and Sarai along Pyandzh River, 2,800 m. Type in Leningrad.

Genus 660. **CHALCANTHUS** * BOISS.**

Boiss., Fl.Or.I (1867) 211.

Sepals erect, not saccate. Petals linear-oblong, purple or pinkish violet. Filaments entire, free. A horseshoe-shaped nectariferous gland at base of shorter stamens, emarginate outside, open inside. Fruit a long, linear, dorsally compressed silique, valves somewhat convex, with a midrib and several lateral, longitudinal nerves. Stigma slightly 2-lobed, sessile. Epidermal walls of the septum multangular. Seeds biseriate or uniseriate.— Glabrous perennials, with amplexicaul cauline leaves and petiolate, cordate-reniform radical leaves.

One species is in Iran, the other in Central Asia.

1. **C. tuberosus** Kom. in A. H. P. XXVI, 2 (1910) 613; Schulz in IV, 105 (1923) 83.— Moricandia tuberosa Kom., Mat. Fl. Turk. nagor. in Tr. SPb. O. E. 26 (1896) 112, No. 222.

Perennial, large, glaucescent plant; rootstock tuberous below, ascending at summit, stout; tuber ovate, compact; crown fibrous; stem 1–3 [sic] 3 cm to 1 m and even taller; radical leaves long-petiolate, subrounded, reniform at base, unequal in size, up to 20 cm long and broad, and even more; lower cauline leaves with shorter petioles, semiamplexicaul, the middle leaves orbicular-obovate, subcordate at base, the upper leaves obtusely oboval, sessile, semiamplexicaul, bracts ovate-lanceolate. Raceme 2–8-flowered; pedicels covered with simple white hairs, or glabrous; sepals 8–14 mm long, broadly linear, obtuse at apex, pilose or glabrous, hyaline at margin; petals oblong, pinkish violet, 15–20 mm long, obtuse or rounded at apex, narrowly clawed; filaments subequal; fruiting pedicels rather thick, 3–4.5 cm long; siliques flattened, linear, glabrous at maturity, up to 25 cm long, sometimes longer, 4–6 mm broad, with a midrib and lateral longitudinal nerves; stigma subsessile; seeds biseriate, smooth, very narrowly marginate, 2.5 mm long, ca. 1.75 mm broad. April.

Rocks, juniper thickets, shrubby thickets, 1,000–1,600–2,000 m or more.— Centr. Asia: Syr D., Zeravshan, Chimgan. Endemic. Described from the Zeravshan Basin, from the Mogian River valley slopes near the town of Mogian. Type in Leningrad.

500 Genus 661. **ANDRZEIOWSKIA** † RCHB.**

Rchb., Iconogr.s.Pl.crit.I (1837) 15 (non DC.); N. Busch in Fl.cauc.crit.III, 4 (1908) 227.

Sepals spreading, equal, not saccate. Petals short-clawed, small, white. A triangular nectariferous gland on both sides of the shorter stamens and in front of each pair of longer stamens. Ovary sessile, style distinct, conical, with a minute capitate stigma. Fruit indehiscent, cylindrical-linear, tetragonous, many-seeded, valves stout, with a keeled dorsal nerve and oblong-triangular horns at summit. Style persistent, nearly as long as horns of silique, cylindrical. Septum coriaceous, sinuate, cells oblong with undulate walls, slightly thickened. Seeds pendulous, biseriate, oblong, angular, slightly bent. Embryo notorrhizal. Hairs absent. — Glabrous annual, delicate, resembling Cardamine, leaves pinnatisect, amplexicaul, dilated at base.

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* From the Greek chalkos — copper and anthos — flower.

** Treatment by N.A. Bush.

† After the botanist Anton Andrzheevskii of Kiev.

A monotypic ancient genus, characteristic for the east Mediterranean; notwithstanding its resemblance to Cardamine, it is related to Lepidium and referred to the tribe Lepidiinae.

1. **A. cardaminifolia** (DC.) Prantl in Engl.-Pr. Nat. Pflanzenfam., III, 2 (1891) 171; N. Busch in Fl. cauc. crit. III, 4 (1908) 228. — Notoceras cardaminefolium DC., Syst. II (1821) 205. — Ic.: Buxbaum, Cent. I, tab. 9, f. 2 (sub Cardamine arvensi); Deless., Ic. sel. pl. II, 6, tab. 18 (sub Notocerate cardaminifolio); Rchb., Ic. s. Pl. crit. I, 15, tab. XIII, f. 27 et 28.

Annual; stem 25—50 cm high. Leaf-segments 4—5-paired, ovate-oblong, obtusely crenate, the terminal slightly larger, 3—5-lobed; petioles at both sides of base with large, semicircular auricles. Flowers small; petals 2—2.5 mm long; fruiting racemes 20—30 cm long, loose, ebracteate; fruiting pedicels 3—5 mm long, clavate-thickened; siliques 12—15 mm long, appressed to axis, straight or slightly bent, horns of valves lanceolate, as long as or slightly longer than style; style ca. 3 mm long. May.

Damp places, rivers, in shade. — Caucasus: W. Transc. (Sochi). **Gen. distr.:** Bal.-As. Min., Syria. Described from Pontus (Black Sea), Bosporus, and Crete. Type in Paris.

501 Genus 662. **LEPIDIUM** * L.**

L., Syst.(1735), Gen.(1737) 192, Sp.pl.(1753) 643; Thellung, Gatt.Lepid.in Mitt.bot.Mus.Univ.Zurich 28 (1906) 72.

Sepals not saccate, white or reddish at margin. Petals small, white, or null. Stamens sometimes 4 or 2. Nectariferous glands 4—6 (median sometimes lacking), tuberclelike or filiform. Silique orbicular, ovate or cordate, compressed at the median plane, 2-valved or (in section Cardaria) indehiscent; valves generally scaphoid, cells 1-seeded. Embryo notorrhizal or (rarely) obliquely pleurorhizal. — Annual, biennial, or perennial.

There are 150 species in Lepidium, 31 of which are common to the Soviet Union. This genus is distributed throughout the world except for the Arctic countries. In the tropical zone it grows in the mountains. It is of an ancient geological epoch and has a center of distribution in every part of the world.

Possibly, the fruit of Lepidium antiquum Heer of the Tertiary deposits of Eningen is not referred to here.

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* From the Greek lepis — scale, lepidion — squamule (after the form of fruit of some species).

** Treatment by N.A. Bush.

	1.	Procumbent annual, silicles very tightly appressed to axis	6. **L. borsczovi** N. Busch.
	+	Not as above	2.
	2.	Glaucous low shrubs. Stems woody at base, radical leaves bipinnate	3.
	+	Stems not woody at base	4.
	3.	Plant sparsely short-hairy. Silicles obtuse at base, slightly cordate, oval, acute	28. **L. meyeri** Claus.
	+	Plant completely glabrous. Silicles rounded-oval, subemarginate at base, subacute at apex	27. **L. turczaninovi** Lipsky.
	4.	All leaves entire or sinuate-dentate	5.
	+	All leaves or only the lower lyrate or pinnate	22.
	5.	Silicle with winged valves	5. **L. campestre** (L.) R. Br.
	+	Silicle not as above	6.
	6.	Cauline leaves more or less sagittate-amplexicaul (auricled)	7.
502	+	Cauline leaves tapering at base	14.
	7.	Silicles indehiscent, inflated	8.
	+	Silicle not as above	11.
	8.	Silicles glabrous, broader than long. Style 1.25—1.3 mm long	9.
	+	Silicles orbicular or oval, longer than broad	10.
	9.	Silicles obcordate	1. **L. draba** L.
	+	Silicles not cordate, rounded at base and apex	3. **L. repens** (Schrenk) Boiss.
	10.	Silicles glabrous, orbicular, slightly cordate or rounded at base, subacute at apex. Style 2 mm long	4. **L. propinquum** Fisch. et May.
	+	Silicles pubescent, oval	2. **L. boissieri** N. Busch.
	11.	Cauline leaves entire, thickish, few (4—6 on stem); radical leaves numerous, persistent even after flowering. Silicles ovate, distinctly tapering at apex. A plant of solonetzic and solonchak soils	12.
	+	Cauline leaves numerous (15—20), more or less dentate, radical leaves withering at flowering. Silicles orbicular or round-elliptic	13.
	12.	Leaves ovate, rarely lanceolate or oblong	14. **L. crassifolium** W. et K.
	+	Leaves lanceolate or linear-lanceolate, low plant	15. **L. pumilum** Boiss. et Bal.
	13.	Leaves green, acutely serrate-dentate	19. **L. amplexicaule** Willd.
	+	Leaves glaucescent, small, obsoletely dentate	20. **L. cordatum** Willd.
	14.	Cauline leaves ovate, oblong or oblong-lanceolate, usually large	15.
	+	Cauline leaves lanceolate-linear or linear, small; silicles glabrous, rarely pubescent	18.
	15.	Silicles pubescent	16. **L. latifolium** L.
	+	Silicles not as above	16.
	16.	Leaves obtuse, flowering raceme capitate, silicles cordate at base	18. **L. obtusum** Basin.
503	+	Leaves acute, inflorescence not capitate	17.
	17.	Inflorescence an oblong or corymbose panicle, stem leafy, leaves oblong-lanceolate or ovate, subcoriaceous, large	17. **L. sibiricum** Schweigg.

+ Fruiting racemes elongated, stems nearly leafless, radical leaves small, not coriaceous, cauline leaves subulate . . . . 25. **L. persicum** Boiss.

18. Silicles pubescent . . . . 29. **L. coronopifolium** Fisch.

+ Silicles glabrous . . . . 19.

19. Leaves sparingly pubescent . . . . 31. **L. graminifolium** L.

+ Completely glabrous plant . . . . 20.

20. Racemes elongate at end of flowering, sepals lately caducous. Silicles obovate. Blade of clawed petals suborbicular . . . . 23. **L. eremophilum** Schrenk.

+ Inflorescence a broad, corymbose panicle . . . . 21.

21. Glaucous plant; inflorescence large, profusely branching; stigma subsessile; plant of dry mountain slopes . . . 24. **L. ferganense** Korsh.

+ Green plant; racemes short, corymbose at summit of branches; style one-half to one-third as long as ovary; plant of solonetzic soil . . . . 30. **L. soongoricum** Schrenk.

22. Silicle with broadly winged valves . . . . 7. **L. sativum** L.

+ Silicle wingless or with very narrow wing at apex . . . . 23.

23. Radical leaves bi- or tripinnate, lobes linear-lanceolate, upper leaves entire, subulate; stem inflated at the nodes . . . 13. **L. vesicarium** L.

+ Stem not inflated at the nodes . . . . 24.

24. Cauline leaves usually entire, subulate-linear, spreading; a low-mountain plant, cespitose. Central Asia . . . . 26. **L. karataviense** Rgl. et Schmalh.

+ Upper leaves not subulate, plant not cespitose . . . . 25.

25. Upper leaves ovate-orbicular, entire, deeply cordate, amplexicaul . . . . 12. **L. perfoliatum** L.

+ Upper leaves much narrower, not amplexicaul . . . . 26.

26. Flowers perfect, with petals and 6 stamens; lower cauline leaves lyrate-pinnate . . . . 27.

+ Flowers with 2, rarely 4, stamens, very often apetalous . . . . 28.

504 27. Lobules of lower cauline leaves coriaceous, oval-rounded, evenly crenate at margin; silicles oblong . . . . 21. **L. lyratum** L.

+ Lobules of lower cauline leaves linear-oblong or lanceolate, acute, entire or few-toothed, terminal lobule larger than the lateral. Silicles orbicular-ovate, tapering at apex . . . 22. **L. lacerum** C. A. M.

28. Rachis and stem glabrous, rarely slightly covered with very short hairs, pedicels always covered with hairs as long as breadth of pedicels. Young silicles pilose, elliptic-oval, hardly emarginate, style nearly as long as notch or longer. Upper leaves usually oblanceolate-spatulate . . . . 11. **L. pinnatifidum** Ldb.

+ Rachis and pedicels evenly pubescent; silicles glabrous, oval, emarginate at apex, style shorter than notch. Upper leaves linear . . . . 29.

29. Hairs capitate . . . . 8. **L. apetalum** Willd.

+ Capitate hairs absent, hairs terete, half as long or longer than breadth of pedicels . . . . 30.

30. Lower leaves bipinnate . . . . 9. **L. ruderale** L.

+ Lower leaves lyrate with a large terminal lobe . . . . 10. **L. virginicum** L.

Section 1. **CARDARIA** (Desv.) DC., Syst. II (1821) 529. — Cardaria (gen.) Desv. in Journ. Bot. III (1814) 163. — Flowers (normal) perfect. Silicles indehiscent, wingless but slightly keeled, inflated. Style thin, at least one-third as long as the septum. Fruiting pedicels thin, spreading, 2 to 3 times longer than silicle (not including style). Cotyledons entire.

1. **L. draba** L., Sp. pl. (1753) 645; Ldb., Fl. Ross. I (1842) 202; Shmal'g., Fl. I (1895) 98; N. Busch in Fl. cauc. crit. III, 4 (1907) 88; N. Busch, Fl. Sib. et Or. Extr. I (1913) 87; Kryl., Fl. Zap. Sib. VI (1931) 1260. — L. diversifolium Fr. et Sint. in Bull. Herb. Boiss. 2 Ser., III (1903) 698. — Ic.: Jacq., Austr. tab. 315 (sub Cochlearia draba); Rchb., Ic. Fl. Germ. f. 4211 (sub Cardaria draba); N. Busch, Fl. Sib. et Or. Extr. I (1913) 88 et tab. geogr. 89. — Exs.: HFR No. 1502.

Perennial, short-pubescent; stems erect, corymbose-branching above, usually 20—50 cm high; radical leaves tapering into petioles, usually sinuate or sublyrate, sometimes subpinnate — f. diversifolium (Freyn) Thell.; lower cauline leaves less deeply sinuate, middle and upper leaves sessile,
505 obovate or elliptic-oblong or lanceolate, cordate-sagittate at base, amplexicaul, up to 6 cm long and 4 cm broad. Flowers in corymbs, fragrant; sepals glabrous, 1.5—2 mm long, white-margined up to one-fourth their width; petals white, 2.5—4 mm long; silicles glabrous, broadly oval-cordate, broader than long, 3—4.5 mm long, 3.5—5 mm broad; style 1—1.3 mm long; seeds ovoid or ellipsoidal, slightly flattened, nearly smooth, not marginate, dark. May—June. (Plate VIII, Figure 3).

Solonetzic steppes, stony slopes, fields, roadsides. — European part: Lad.-Ilm (introduced), M. Dnp., U. Dnp. (introduced), Bl., V.-Don, U. V. (introduced), L. Don, L. V., Trans., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; W. Siberia: U. Tob., Irt., Alt.; E. Siberia: Ang.-Say.; Centr. Asia: Balkh., Ar.-Casp., Kara K., Kyz. K., Amu D., Syr D., Dzu.-Tarb., Mtn. Turkm. **Gen. distr.:** Med., Bal.-As. Min., Syria, Palestine, Arm.-Kurd., Iran. Introduced into nearly all Europe and N. America. Described from Europe. Type in London.

Economic importance. The seeds have a spicy flavor and may be used as a substitute for pepper.

Note. A Mediterranean species, sensu Engler.

2. **L. boissieri** N. Busch in Addenda VII, p. 651. — L. propinquum var. auriculatum Boiss., Fl. Or. I (1867) 357. — L. chalepense var. auriculatum N. Busch in Fl. cauc. crit. III, 4 (1907) 93. — L. draba ssp. chalepense Thell., Monogr. Lepidium (1906) 86, 88.

Perennial, gray-pubescent or glabrous; stems erect, corymbose-branching above; leaves oblong, eroded-dentate, radical leaves tapering into a petiole, cauline leaves acutely sagittate at base, lanceolate or broadly lanceolate, not tapering at base. Petals white, 3 mm long; silicles orbicular-ovate, woolly, flattened, rounded or slightly tapering at base, not cordate, rounded-tapering at apex, 4.5 mm long, 4 mm broad, valves keeled, scarcely inflated; style 1.25—1.3 mm long. June. (Plate XXVII, Figure 1).

Stony slopes and gravels. — Caucasus: S. Transc. (Armenia). **Gen. distr.:** Arm.-Kurd. Described from Koshadar (Armenia), where collected by Shovits. Type in Leningrad.

Note. Related to L. chalepense L., which it replaces in the Soviet Union and the adjacent areas of Turkey.

3. **L. repens** (Schrenk) Boiss., Fl. Or. I (1867) 356. — Physolepidium repens Schrenk in Fisch. et Mey., Enum. pl. nov. (1841) 97; Ldb., Fl. Ross. I (1842) 766. — Lepidium draba ssp. chalepense var. β repens Thell., Monogr. Lepidium (1906) 89.

506 Perennial, pubescent with short simple hairs; rootstock creeping; stem corymbose-branching; leaves oblong, erose or dentate, radical leaves tapering into a petiole, cauline leaves few, dentate, cordate-amplexicaul, acutely auricled. Sepals ca. 2.5 mm; petals ca. 3.5 mm, white; silicles glabrous, inflated, oblate, broader than long, ca. 4.5—5 mm long, ca. 5.5—6 mm broad, rounded at base and apex, not cordate, style ca. 1.5 mm long, cells sometimes 2-seeded. May—June.

Stony slopes and solonetzic deserts. — Centr. Asia: all regions. **Gen. distr.:** As. Min., Afghanistan. Described from the Kirghiz Desert. Type in Leningrad.

4. **L. propinquum** Fisch. et May. in Hohen., Enum. Talysch (1838) 142; Ldb., Fl. Ross. I, 202; N. Busch in Fl. cauc. crit. III, 4 (1907) 92.

Perennial, short-pubescent; stems erect, corymbose-branching in upper part, 20—50 cm high; leaves oblong, acute, dentate, radical leaves tapering into a petiole, cauline leaves sessile, more or less tapering toward base. Petals white, 2.5—3 mm long; silicles orbicular, subcordate or rounded at base, subacute, 2.5—3 mm long, 3—3.5 mm broad, style 2 mm long. April—May.

Dry slopes and hills. — Caucasus: Cisc. (Groznyi), E. and S. Transc., Tal.; Centr. Asia: Mtn. Turkm. Described from Elenendorf and Talysh. Type in Leningrad.

Section 2. **LEPIA** (Desv.) DC., Syst. II (1821) 534. — Flowers perfect. Silicles dehiscent, winged only at apex, wings more or less adnate to style. Style exceeding wing. Fruiting pedicels terete or slightly angular, more or less spreading, as long as silicle. Cotyledons entire.

5. **L. campestre** (L.) R. Br. in Ait. Hort. Kew. ed. 2, IV (1812) 88; Ldb., Fl. Ross. I, 204; Shmal'g., Fl. I, 100; N. Busch, Fl. cauc. crit. III, 4 (1907) 94. — Thlaspi campestre L., Sp. pl. (1753) 646.

Annual or biennial, densely soft-pubescent with spreading hairs, rarely glabrescent (v. glabrata Lej. et Court.); stem 20—50 cm high, solitary, rarely several, erect, more or less angular-sulcate, densely leafy, usually corymbose-branching above, rarely simple; radical leaves oblong, sinuate-dentate, tapering into a petiole, middle and upper leaves triangular or ovate-lanceolate, subobtuse, cordate-sagittate at base, amplexicaul, obtusely auricled. Flowers in racemes; petals white, 2.5 mm long; silicles broadly oval, winged at apex, strongly convex below, shallowly emarginate at apex, 5—7 mm long, 4—6 mm broad, slightly rounded at base; valves scabrid from
507 more or less dense scalelike verrucae; wing lobes one-fourth as long as silicle; style short, barely exserted from notch; seeds ovate, hardly flattened, more or less torulose, not marginate, dark, 2—2.5 mm long, 1—1.5 mm broad. April—May.

Forest meadows, forest edges, roadsides, gravel of streams, up to 2,100 m. — European part: U. Dnp., M. Dnp., U. V., V.-Don, L. Don, Bl., Crim.;

Caucasus: Cisc., W. Transc., Dag., E. Transc. (Adzhikabul). **Gen. distr.:** all Europe, except for the Arctic and N. Scandinavia, Arm.-Kurd. Introduced into N. Am. Described from Europe. Type in London.

Economic importance. Eaten as salad in the Caucasus. Honey plant.

Section 3. **LEPIDOCARDAMON** Thell., Monogr. Lepid. (1906) 74. — Flowers perfect. Fruiting pedicels erect, flattened, distinctly shorter than silicle. Style much shorter than wing.

6. **L. borsczovi** N. Busch, sp. nova in Addenda VII, p. 489. — L. aucheri var. borsczovi Rgl., Suppl. II ad Regl. et Herd., Enum. pl. Semen (1870) No. 118, p. 43; Kryl., Fl. Zap. Sib. VI (1931) 1260.

Annual, small plant; stem 1.5—8 cm high, diffusely branching from base, trailing, glabrescent or covered above (like the branches, pedicels, and petioles) with very short aculeate hairs; radical leaves rosetted, oblong, irregularly pinnatifid up to middle, with rounded-obtuse lobes; petioles winged, short; cauline leaves rhombic-oval, cuneately tapering at base, bidentate at both sides. Flowers small, in short dense racemes; sepals broadly ovate, subobtuse, membranous, 3-nerved, as long as corolla; silicles ovate, 2.5—3 mm long, 2 mm broad, numerous, imbricate in spiciform racemes, winged at apex with a median triangular notch (0.3—0.75 mm) and several divergent denticles; style very short, as long as one-third the notch; fruiting pedicels 1.5—2 mm long; seeds yellowish, cylindrical-ovate, very narrowly striate, ca. 1.5 mm long and 0.8 mm broad. April—May. (Plate XXVIII, Figure 2).

Solonetzic and solonchak soils. — Centr. Asia: Balkh., Kara K. Endemic. Described from Kara-Kum. Type in Leningrad.

Note. This species replaces L. aucheri Boiss. in the Soviet Union. The latter is common to Asia Minor, Armenia and Kurdistan, Syria, S. Iran, Afghanistan, and Baluchistan.

Section 4. **CARDAMON** DC., Syst. II (1821) 533. — Flowers perfect, with petals and 6 stamens. Silicle dehiscent, winged at apex. Style slightly shorter or longer than wings. Fruiting pedicels cylindrical, only slightly (20—30°) diverging from axis, shorter than silicle. Cotyledons tripartite or trifid.

508 7. **L. sativum** L., Sp. pl. (1753) 644; Ldb., Fl. Ross. I, 203; Shmal'g., Fl. I, 99; N. Busch in Fl. cauc. crit. III, 4 (1907) 98; Kryl., Fl. Zap. Sib. VI (1931) 1259. — Ic.: Sibth. et Sm., Ic. Fl. Graec. tab. 616; Rchb., Ic. Fl. Germ. f.4212.

Annual, usually glabrous; stem solitary, erect, paniculate, with erect branches; radical leaves irregularly pinnate or bipinnatisect or lobate, rarely only dentate, obovate; upper leaves linear, entire, acute. Flowering racemes strongly elongated, loose, axis usually completely glabrous; pedicels cylindrical, glabrous, one-half to one-third as long as silicle; petals white or pinkish, 3 mm long; silicles orbicular-ovate, emarginate, winged from the middle or from the lower third up to the apex, 5—6 mm long, ca. 4 mm broad, style nearly as long as notch; seeds ovate, only slightly flattened, nearly smooth, not marginate, dark rufous. April—May.

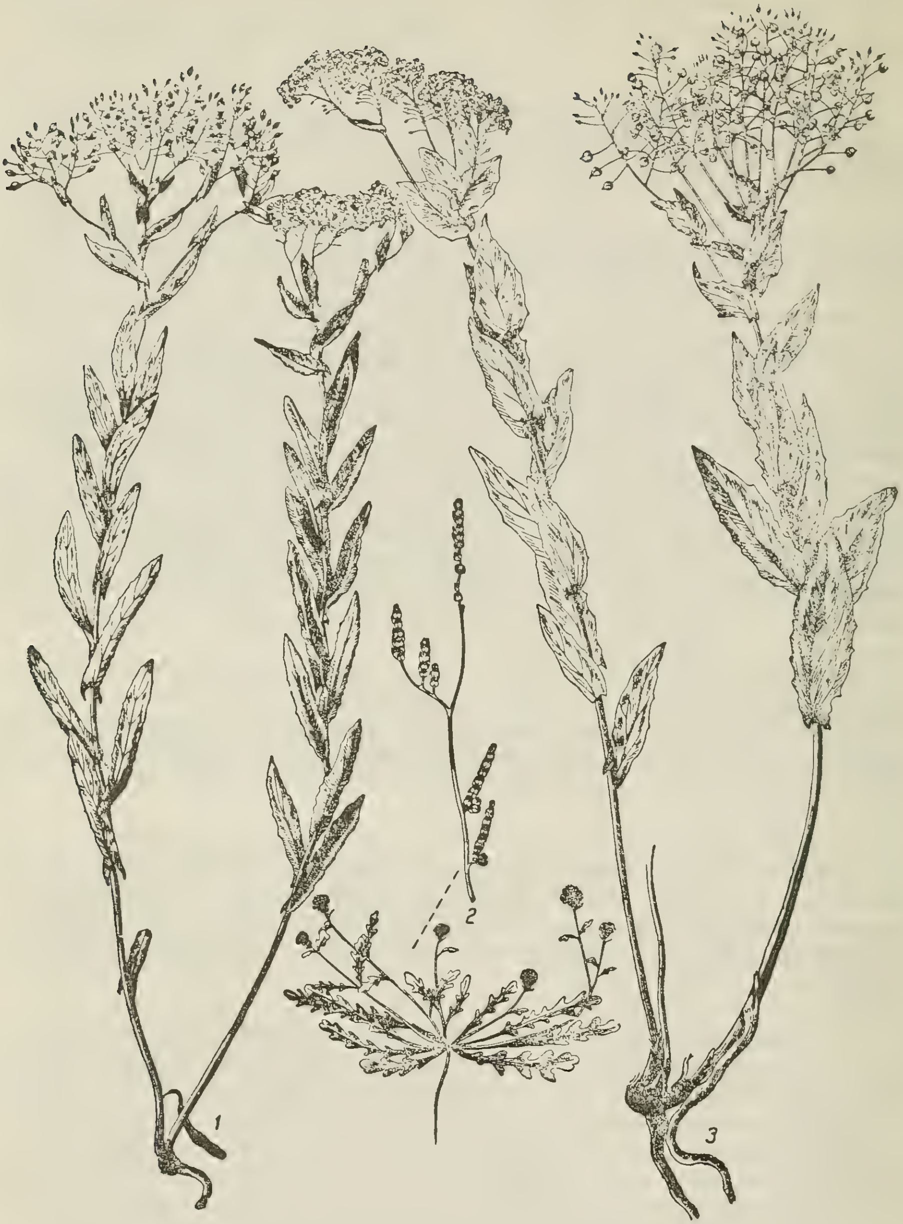

PLATE XXVIII. 1 – Lepidium boissieri N. Busch; 2 – L. borsczovi N. Busch, plant with flowers and inflorescence, with petals; 3 – L. draba L. with flowers and petals.

Cultivated areas, field borders, wild or cultivated, in the southern and central parts of Europe, up to the U. Dnp., U. V., V.-Don, Crim., and in the Caucasus. According to Thellung, the original area comprised Kordofan, Abyssinia, Egypt, Sinai, Arabia, Palestine, Syria, Mesopotamia, Iran, Punjab, and W. Himalayas. Described from Europe. Type in London.

Economic importance. In cultivation the plants are divided into smooth-leaved and crisp-leaved varieties. The fresh herbs are used in the spring for salad or for seasoning in other salads. They contain diuretic and antiscorbutic properties and the bitter lepidene is used to counter high fevers. The seeds contain 58% fatty oil which is suitable for illumination. As a honey plant it is of secondary value. Grows best in moist soils and in shade.

Section 5. **NASTURTIOIDES** (Medik.) Thell., Lepid. (1906) 75, 126. — Flowers often imperfect (with rudimentary petals or none and with reduced number of stamens). Silicle dehiscent, wingless or winged, wings not adnate to style. Style shorter, equal to or longer than notch. Fruiting pedicels usually as long as or longer than silicle, generally recurved at an angle of 45—90°. Cotyledons always entire.

8. **L. apetalum** Willd., Sp. pl. III (1800) 439; Shmal'g., Fl. I, 100; N. Busch in Fl. Sib. et Or. Extr. I (1913) 90; Kryl., Fl. Zap. Sib. VI, 1262. — L. micranthum Ldb., Icon. pl. Fl. Ross. (1829) 22. — Ic.: Ldb., l. c., N. Busch, Fl. Sib. et Or. Extr. I, 92 et tab. geogr. 93.

Annual or biennial; stem erect, 4—44 cm high, covered with capitate, 511 short hairs, visible only under magnification; lower leaves oblong, pinnatifid or pinnatisect, with entire or incised lobes; upper leaves linear, entire or largely serrate-dentate close to apex. Flowers minute; sepals ovate, much wider than in L. ruderale, deciduous, dorsally pilose, with white margin, often reddish at apex; petals shorter than calyx, obsolete, triangular-ovate, one-eighth to one-tenth as long as calyx; terminal fruiting racemes elongated, loose, axillary — short and dense; rachis covered with capitate hairs; pedicels thin, with very short hairs; silicles orbicular-elliptic, flattened, 3 mm long, 2.25—2.5 mm broad, with small notch at summit and rather short style; valves very narrowly winged in upper part; seeds flattened, reddish-grayish brown, elliptic, almost smooth, not marginate, 1.25 mm long, 0.6—0.75 mm broad. May—June—August.

Steppes, solonetzic soils, roadsides, weed-infested places. — European part: M. Dnp., L. V.; W. Siberia: Ob (S.), U. Tob., Irt., Alt.; E. Siberia: Yenis. (S.), Ang.-Say., Lena-Kol. (S.), Dau.; Far East: Ze.-Bu., Uss. (S.); Centr. Asia: Balkh., Syr D., Pam.-Al. **Gen. distr.:** Dzu.-Kash., Mong., Tib., Ch., Korea, Manchuria. Introduced into western Europe. Described from Siberia. Type in Berlin.

Note. Readily distinguished from the related species L. ruderale L. by its pubescence of capitate hairs on stem.

9. **L. ruderale** L., Sp. pl. (1753) 645; Ldb., Fl. Ross. I, 204, 765 (excl. loc. Baical et Dahuriam); Shmal'g., Fl. I, 100; N. Busch in Fl. cauc. crit. III, 4 (1907) 100; Fl. Sib. et Or. Extr. I (1913) 94; Kryl., Fl. Zap. Sib. VI, 1261. — Ic.: Rchb., Ic. Fl. Germ. tab. X, f. 4215; N. Busch, Fl. Sib. et Or. Extr. I, 95 et tab. geogr. 95. — Exs.: HFR No. 1557.

Annual or biennial; stem usually solitary, 5.5–25 cm high, erect, branching, covered with very short terete hairs; lower leaves long-petioled, bipinnate, leaflets incised into wide linear or subspatulate lobes, upper leaves linear, entire. Sepals narrowly ovate-lanceolate, white-margined; petals null; stamens 2; fruiting racemes elongated, rather dense; silicles orbicular-elliptic, 2.25–2.5 mm long, 1.75–2 mm broad, with small notch at apex and a rather short style, valves narrowly winged in upper part; seeds oval, flattened, nearly smooth, not marginate, dark yellow, 1.25–1.5 mm long, 0.75 mm broad. April–August.

Steppes, solonetzic soils, growing as weeds by roadsides, habitations, waste lands — European part: all, from Karelia-Lapland, Dvina-Pechora to the Crimea; Caucasus: Cisc., Dag., W., E., and S.Transc.; W. Siberia: Ob (S.), U. Tob., Irt., Alt.; E. Siberia: Yenis. (S.), Ang.-Say.; Centr. Asia: Ar.-Casp.,
512 Balkh. **Gen. distr.:** Eur., except for N. Norway, N. Sweden, large parts of Finland, Portugal, As. Min., Mesopotamia, Arm.-Kurd. Introduced into other places, mainly in cities. Described from Europe. Type in London.

10. **L. virginicum** L., Sp. pl. (1753) 645; Kom. i Alis., Malyi opred. I (1931) 579.

Annual, pubescent like L. ruderale L., small; stem (8)30–50(60) cm high, strongly branching in upper part; radical leaves lyrate, with large, obovate or suborbicular terminal lobe and very tiny lateral lobes, dentate; cauline leaves lobate or [?] linear; sepals elliptic, deciduous; petals white, obovate-spatulate; stamens 2–4; pedicels short-pubescent; silicles glabrous, orbicular or rounded-oval, 3–4 mm in diameter, with a small wing at apex.

Growing as a weed along railroad tracks and in waste lands.— Far East: Uss. Introduced from America. Described from North America. Type in London.

11. **L. pinnatifidum** Ldb., Fl. Ross. I (1842) 206; Thellung, Gatt. Lepidium 140; N. Busch in Fl. cauc. crit. III, 4 (1907) 103.— L. pinnatifidum et ssp. fastigiatum Shmal'g., Fl. I, 101.

Annual or biennial; stem usually suberect, completely glabrous, branches ascending, pyramidal; radical leaves pinnatifid, lobes divergent, notched-dentate, narrowly oblong, the upper subentire, oblanceolate-spatulate. Sepals ovate or elliptic-lanceolate, white at margin; petals rudimentary, linear-spatulate, usually shorter than calyx and always narrower, sometimes null; stamens 2–4, long (the median), shorter stamens absent; fruiting racemes rather loose, rachis thin, nearly always completely glabrous or downy with short hairs; pedicels very thin, covered with rather long spreading hairs, nearly as long as width of pedicels, ascending, usually longer than silicle; silicles broadly elliptic or oval-elliptic or suborbicular, entire, very narrowly pteroid-carinate, obscurely notched, sparingly pubescent, 2–2.75 mm long, 1.75–2.3 mm broad; stigma very short; seeds narrowly ovate-ellipsoidal, flattened, slightly pitted-tubercled, not marginate, dark yellow or dark rufous, 1–1.25 mm long, 0.5–0.75 mm broad. April–May.

Solonetzic places, solonchaks, banks of salt lakes and seashores.— European part: L. V.; Caucasus: Cisc. (Kizlyar, Tambukan Lake), E. Transc. (shores of the Caspian); Centr. Asia: lowland parts of all Central Asia. **Gen. distr.:** Ind.-Him. Described from the environs of Astrakhan. Type in Leningrad.

12. **L. perfoliatum** L., Sp. pl. (1753) 643; Ldb., Fl. Ross. I, 206, 765; Shmal'g., Fl. I, 100; Thell., Lepid. (1906) 147); N. Busch in Fl. cauc. crit. III,
513 4 (1907) 104; N. Busch, Fl. Sib. et Or. Extr. I (1913) 96; Kryl., Fl. Zap. Sib. VI (1931) 1263. — Ic.: Jacq., Fl. Austr. IV (1776) tab. 346; Rchb., II, tab. X, f. 4217; N. Busch, Fl. Sib. et Or. Extr. I (1913) 96 et tab. geogr. 97. — Exs.: HFR No. 754.

Annual or biennial; stem single, suberect, 8—30 cm high, with spreading thin hairs, rarely glabrescent, branching from base or only in upper part. Lower leaves pubescent, radical leaves long-petioled, bipinnatipartite into narrow-linear lobes; lower cauline leaves less divided, subsessile, upper leaves broadly oval or suborbicular, subacute, entire, deeply cordate at base, sessile, amplexicaul, completely glabrous, netted-veined. Sepals broadly elliptical, narrowly hyaline at margin, dorsally pubescent, ca. 1 mm long; petals pale yellow (straw-colored); oblong, ca. 1.5 mm long; fruiting racemes elongated, completely glabrous, pedicels 4—7 mm long; silicles suborbicular or broadly oval or almost broader than long, 3—4.5 mm long and broad, small-notched and nearly wingless at apex; style short, as long as or slightly longer than notch; seeds oval, flattened, rather smooth, narrowly marginate, dark brown, 1.75—2 mm long, 1—1.25 mm broad. April—July.

Solonetzic steppes, field borders, dry hills, up to 1,000 m. — European part: part: M. Dnp., V.-Don, Bl., L. V., Transv., Crim.; Caucasus: Cisc., Dag., W., E., and S. Transc., Tal.; W. Siberia: Alt., Irt.; Centr. Asia: all Central Asia except for the high-mountain areas. **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him. Described from Europe. Type in London.

Note. A Near Asian and East Mediterranean species. Introduced by man far beyond the range of its original distribution area.

13. **L. vesicarium** L., Sp. pl. (1753) 643; Ldb., Fl. Ross. I, 206; N. Busch in Fl. cauc. crit. III, 4 (1907) 107.

Annual; stem completely glabrous, erect, flexuous, 20—40 cm high, dichotomously branching nearly from base, nodes nearly always inflated and with cavities inside; leaves slightly pubescent, the lower cauline bipinnatipartite, lobes linear, upper leaves sessile, pinnatipartite, with strigose lobules, the uppermost leaves entire, setose. Sepals suborbicular, broadly white-margined; petals 2.3—3 mm long, rounded-obovate, clawed, white or straw-colored; racemes elongating in fruit, loose; pedicels completely glabrous, ascending, usually 1.5—2 times longer than silicle; silicles rhombic-elliptic or rhombic-oval, acuminate at both ends, narrowly winged and slightly emarginate at apex, 3—3.75 mm long, 2—2.5 mm
514 broad, sometimes 2—2.5 mm long, 1.5—1.75 mm broad (var. microcarpum N. Busch); stigma protruding; seeds narrowly ovate, flattened, rather smooth, margined, dark, ca. 1.5 mm long, ca. 1 mm broad. April—May.

Dry hills, steppes, solonetzic soils, and weed-infested places. — Caucasus: E. and S. Transc., Tal. **Gen. distr.:** Arm.-Kurd., N. Iran. Described from Media. Type in London.

Note. This species resembles L. lyratum L. in its flowers and L. pinnatifidum Ldb. in its fruit and completely glabrous rachis.

14. **L. crassifolium** W. et K., Pl. rar. Hung. I (1799) 4, tab. 4; Ldb., Fl. Ross. I, 208, 765; Shmal'g., Fl. I, 98; N. Busch in Fl. cauc. crit. III, 4 (1907) 109; Fl. Sib. et Or. Extr. I (1913) 97; Kryl., Fl. Zap. Sib. VI, 1267. — L. cartilagineum ssp. crassifolium Thell., Lepid. (1906) 153, 154. — Ic.: Rchb., Ic. Fl. germ. tab. X, f. 4220; N. Busch, Fl. Sib. et Or. Extr. I, 98 et tab. geogr. 99. — Exs.: Fl. Cauc. exs. XII, No. 279.

Perennial; root covered at summit with decayed leaves; stem suberect, dichotomously corymbiform-paniculate, 20—50 cm high, glabrous below, pilose above; leaves thickly coriaceous, usually glaucous, glabrous, radical leaves long-petioled, ovate, rarely lanceolate or oblong, entire, cauline leaves lanceolate, sessile, sagittate-amplexicaul. Sepals ovate, broadly white-margined; petals white, broadly obovate, clawed, 1.5—2 mm long or sometimes narrower, linear (var. angustipetalum Keller); fruiting racemes rather short and dense; pedicels and rachis canescent with simple and clavate hairs, ascending, nearly 1.5 times as long as silicle; silicle netted-veined, oval or subrhomboidal, subobtuse at base, acuminate at apex, entire, 3—4 mm long, 2.75—3.5 mm broad; style short, protruding from notch; seeds ovate, flattened, slightly pitted-tubercled, marginate, dark rufous. April—May. (Plate XXVIII, Figure 2).

Solonetzic and saline sandy places. — European part: M. Dnp., Bl., V.-Don, L. V., V.-Kama, L. Don, Crim.: Caucasus: Cisc., Dag., E. and S. Transc.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Kyz. K., Kara K., Syr D. **Gen. distr.:** Centr. Eur., As. Min., Syria, Arm.-Kurd., Iran., Afghanistan, Baluchistan, Kuldja. Described from Hungary. Type in Budapest.

15. **L. pumilum** Boiss. et Bal. in Boiss., Diagn. 2 Sér. IV (1859) 21; Boiss., Fl. Or. I (1867) 358; L. salinum — L. crassifolium var. pumilum Thell., Gatt. Lepid. (1906) 153, 155; N. Busch in Fl. cauc. crit. III, 4 (1907) 111.

Perennial; similar to L. crassifolium W. et K., but stem low, 7—13 cm high, leaves lanceolate or linear-lanceolate, cauline leaves broad at base, nearly always without auricles, semiamplexicaul. May. (Plate XXIX, Figure 1).

515 Moist solonchaks. — European part: Bl., Crim. (Kerch Peninsula). **Gen. distr.:** As. Min. Described from solonchaks west of Caesarea in Cappadocia. Type in Geneva.

Note. There are transitions (or hybrids?) between L. crassifolium W. K. and L. pumilum Boiss. et Bal. One of such plants common only to the Crimea and Asia Minor.

16. **L. latifolium** L., Sp. pl. (1753) 644; Ldb., Fl. Ross. I, 206, 265; Shmal'g., Fl. I, 98; N. Busch in Fl. cauc. crit. III, 4 (1907) 111. — L. latifolium ssp. eu-latifolium Thell., Gatt. Lepid. (1906) 159, 160; N. Busch, Fl. Sib. et Or. Extr. I, 101 et tab. geogr. 102. — Exs.: A. Bunge, Fl. exs. Esth-Liv-und Kurland No. 82.

Perennial, slightly pubescent or glabrous; stem 40 cm to 1.5 m high, completely glabrous, paniculate; leaves oblong-lanceolate or ovate, acute, almost coriaceous, entire or dentate, sometimes narrow and lanceolate (var. angustifolium C. A. M.), radical leaves long-petioled, other leaves sessile, tapering at base, upper leaves bracteal, ovate or linear-lanceolate, white-margined above. Racemes in a pyramidal or corymbose panicle; sepals suborbicular, broadly white-margined, usually dorsally pubescent;

petals suborbicular, clawed, white, 2–3 mm long; silicles broadly elliptic or oval-orbicular, 1.5–2.75 mm long, 1.5–2.3 mm broad, sometimes emarginate at base, entire at apex or very shallowly notched; valves wingless, slightly keeled, pubescent, style almost null; seeds broadly ellipsoidal, more or less flattened, rather smooth, marginate. May–July.

Solonetz saline places and solonchaks.— European part: U. Dnp., M. Dnp., U.-Don, U. V., Middle V., Transv., Crim.; Caucasus: Cisc., Dag., E. Transc., Tal.; W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Ar.-Casp., Kyz. K., Kara K., **Gen. distr.:** Scand., Atl. and Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Ind.-Him., Tib. Described from Europe. Type in London.

Economic importance. Used for salad or as a spice.

17. **L. sibiricum** Schweigg., Enum. pl. hort. Regiomont. (1812) 43.— L. affine Ldb., Ind. sem. H. Dorp. (1821) App. 1, p. 22.— L. latifolium var. affine C. A. M. in Ldb., Fl. Alt. III (1831) 189; Ldb., Fl. Ross. I (1842) 207.— L. latifolium ssp. sibiricum Thell., Lepid. (1906) 159, 161; N. Busch, Fl. Sib. et Or. Extr. I (1913) 100 cum tab. geogr. 102; Kryl., Fl. Zap. Sib. VI (1931) 1265.

Perennial, glabrous, or slightly pubescent; cauline leaves oblong-lanceolate, sessile, acute; silicles glabrous. Otherwise, similar to L. latifolium L. May–June.

516 Solonetzic, solonchak, and saline steppes.— W. Siberia: Alt., Ang.-Say., Dau.; Centr. Asia: Syr D., Balkh., Kara K. **Gen. distr.:** Iran., Ind.-Him., Tib., Mong., Ch. Described from the Königsberg [Kaliningrad] Botanical Garden. Type in Königsberg.

Note. Related to L. latifolium L., but geographically isolated from it. Both share a common origin.

18. **L. obtusum** Basin. in Bull. Acad. Sc. St.-Pétersb. II (1844) 203; Boiss., Fl. Or. I (1867) 359.

Perennial, glabrous, glaucous with a stout rootstock; stem high, 70–100 cm, densely and corymbosely branching; all leaves thick-coriaceous, oblong, obtuse, entire or obscurely sinuate, lower leaves tapering into a petiole, the upper sessile, gradually tapering toward apex and abruptly toward base. Racemes even in fruit, densely capitate; flowers small; calyx long persistent, sepals suborbicular, broadly white-margined, up to 1 mm long; petals white, ca. 2 mm long, clawed, suborbicular blade; pedicels filiform, pilose, ca. 4 mm long; silicles netted-veined, minute, rotund-oval, subcordate at base, subobtuse, ca. 2 mm long and broad, glabrous; stigma sessile, capitate; seeds small, elliptic-obovate, somewhat flattened from sides, immarginate, smooth. May–June.

Solonetzic and saline deserts.— Centr. Asia: Kara K., Amu D., Syr D. **Gen. distr.:** Kuldja. Described from the Kara-Kum Desert. Type in Leningrad.

Note. Resembling in appearance L. latifolium L., but leaves are obtuse, fruiting raceme is capitate, and the silicles are cordate at base.

19. **L. amplexicaule** Willd., Sp. pl. III (1800) 436; Ldb., Fl. Ross. I, 207; N. Busch, Fl. Sib. et Or. Extr. I, 103; Kryl., Fl. Zap. Sib. VI, 126.— L. latifolium ssp. amplexicaule Thell., Gatt. Lepid. (1906) 159, 163.— Ic.: N. Busch, l. c., 103 et tab. geogr. 104.

Perennial; root stout, creeping; stem 15—42 cm high, branching, pubescent at base; leaves glabrous, subcoriaceous, acutely serrate-dentate, sometimes entire (var. integrifolium Kryl.), lower leaves obovate, tapering into a petiole, obtuse, cauline leaves oblong, slightly cordate at base, semiamplexicaul, acute at apex, uppermost leaves smaller, entire. Flowers as in L. latifolium L.; silicles orbicular-elliptic, 2.5—3 mm long, 2—2.25 mm broad, glabrous; style 0.5 mm long; seeds like in L. latifolium L. June—July.

Solonetzic and saline steppes. — W. Siberia: Alt. (Chuya), U. Tob., Irt.; Centr. Asia: Balkh., Ar.-Casp. **Gen. distr.:** N. Mong. Described from Irtysh. Type in Berlin.

Note. Species related to L. latifolium.

517 20. **L. cordatum** Willd. ex Stev. ap. DC., Syst. II (1821) 554; Ldb., Fl. Ross. I, 207, 765; N. Busch, Fl. Sib. et Or. Extr. I (1913) 104; Kryl., Fl. Zap. Sib. VI (1931) 1266. — Ic.: Ldb., Icon. pl. Fl. Ross. I (1829) tab. 154.

Perennial, glabrous; root stout, often multicipital; stems few, 16—43 cm high, strongly branching nearly from base; radical leaves petioled, obovate, sometimes pinnatisect, already deciduous at flowering; cauline leaves numerous, dense, sessile, oblong, cordate at base, finely- and obscurely-toothed or entire, glaucescent-green, rigid, subcoriaceous. Flowers and seeds as in L. latifolium L. and L. amplexicaule Willd.; silicles orbicular or suborbicular, broader at base, sometimes slightly cordate, 2—2.25 mm long, 1.75—2.25 mm broad, glabrous; style 0.25 mm long. June—July.

Solonetz. — W. Siberia: Alt., U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh., Pam.-Al. **Gen. distr.:** N. Mong. Described from Siberia. Type in Berlin.

Note. Related to L. latifolium. Varies in size of flowers and width of leaves. There is a depressed specimen from Bet-Pak-Dala, collected by Mironov and Pazij, which is large-fruited and narrow-leaved. There are similar forms also from other places.

21. **L. lyratum** L., Sp. pl. (1753) 644; N. Busch in Fl. cauc. crit. III, 4 (1907) 115. — L. lyratum ssp. eu-lyratum Thell., Gatt. Lepid. (1906) 166, 167. — Ic.: Tournef., Voy. II (1717) 339, tab. 339.

Perennial; root fibrous above; stem usually 20—40 cm high, erect, completely glabrous or pubescent, corymbosely branching, sometimes stem higher, ca. 50 cm, with very few, subfiliform branches and leaves much narrower than in type (var. junceum N. Busch); leaves subcoriaceous, completely glabrous or more or less pubescent, radical leaves rather long-petioled, oblong or lanceolate in outline, lyrate-pinnatisect, lobes obtuse, obtusely incised-dentate at margin, crisp, with 1—2 lower segments on both sides oval-rounded, petiolulate, terminal segment cordate at base, ovate-oblong and much larger than the others; middle and upper leaves obovate or oblanceolate. Calyx deciduous, sepals suborbicular, broadly white-margined; petals suborbicular, clawed, white, 1.5—2 mm long; fruiting racemes rather long; pedicels slightly thickened at tip, often pubescent, suberect or more or less divergent, longer than silicle; silicles oval or elliptic, not emarginate at apex, 2—2.5 mm long, 1.3—1.5 mm broad, style very short, one-eighth to one-tenth as long as mature silicle; seeds narrowly ovate,
518 more or less flattened, rather smooth, immarginate, dark rufous or brown. June. (Plate XXIX, Figure 4).

Rocks, taluses, and dry hills. — Caucasus: Dag., S. Transc. **Gen. distr.:** Arm.-Kurd., Iran. (N.). Described from Armenia between the Araks River and Mount Ararat. Type in London.

Note. A mountain xerophyte.

22. **L. lacerum** C. A. M. in Ldb., Ic. Fl. Ross. II (1830) tab. 162; C. A. M. in Ldb., Fl. Alt. III (1831) 191; Ldb., Fl. Ross. I (1842) 203, 765; Boiss., Fl. Or. I, 360; Kryl., Fl. Zap. Sib. VI (1931) 1261.

Perennial, glabrous; stem erect, branching from upper half, 40—60 cm high, branches ascending; radical and lower cauline leaves with petioles nearly as long as the 3—9 cm long and 1.5—3 cm wide blade, oblong-elliptic or oblong, shallowly pinnate, sublyrate-incised with linear-oblong or lanceolate, acute, entire or slightly dentate lobes, the terminal lobe larger than the lateral; middle leaves somewhat smaller, with much shorter petioles, pinnatifid, upper leaves subsessile, lanceolate or linear, entire or few-toothed in upper part. Flowers white, borne on 2—4 mm long pedicels, in racemes elongating up to 3—4 cm and more in fruit; sepals suborbicular, glabrous, reddish, broadly white-margined; petals obovate, tapering into a wide claw one-third as long as the blade, together with blade 2.5—3 mm long, 1.5—1.75 mm wide, 3 times longer than sepals; silicles orbicular-ovate, tapering toward apex, 2—2.5 mm long, 1.5—2 mm broad. May—June.

Dry clayey solonetzes. — W. Siberia: Irt.; Centr. Asia: Balkh., Syr D. (Zeravshan). **Gen. distr.:** Iran. Described from the Dzungarian semidesert near the Irtysh River, on clayey solonetzes. Type in Leningrad.

23. **L. eremophilum** Schrenk in Bull. Acad. Pétersb., Phys.-Math. II (1844) 199.

Perennial, completely glabrous; stem erect, much-branched, 30—50 cm high; lower leaves petioled, linear-lanceolate, slightly dentate, upper leaves linear, tapering toward base, entire. Racemes elongate at end of flowering; pedicels longer than flowers; stamens 6; sepals late deciduous, 1.2 mm long; petals 2 times longer than sepals, 2.5 mm long, claw filiform, blade suborbicular; fruiting pedicels 5—6 mm long; silicle oblanceolate, entire; stigma sessile.

W. Siberia: Irt. (Ters-Akkan). Endemic. Described from Ters-Akkan. Type in Leningrad.

Note. Resembles L. coronopifolium in appearance.

519 24. **L. ferganense** Korsh., Fragmenta Florae turkest. I (1898) 417.

Perennial, completely glabrous, glaucous; stem solitary or 2—3, erect, branching, 30—100 cm high; leaves lanceolate or linear-oblong, simple, radical and lower cauline leaves long-petioled, often strongly serrate, the rest entire, tapering into a short petiole, obtuse or acute at apex. Flowers white, in large corymbiform panicle; pedicels 2—4 times longer than calyx, fruiting pedicels 4.5—5.5 mm long; sepals orbicular-oval, strongly convex, broadly pellucid-hyaline, ca. 1 mm long; petals white, twice as long as sepals, broadly obovate, short-clawed, 2—2.5 mm long; nectariferous glands only median, large, broad, 3-lobed, forming a six-lobed ring around the ovary; stamens subequal, long, sometimes adnate to petals; silicles ca. 2.5 mm long, ca. 2.2 mm broad, broadly oval or suborbicular, obtuse at apex, stigma subsessile, valves carinate, wingless, smooth; seeds rufous, 3-angled, 1.5—1.6 mm long, 0.8—0.9 mm broad; cotyledons entire. May—July.

Dry clayey and stony mountain slopes, 600–1,200 m. – Centr. Asia: Fergana. **Gen. distr.:** Dzu.-Kash. (Kuldja). Described from Fergana. Type in Leningrad.

Note. This species is distinguished from L. soongoricum by its much branching inflorescence, and from the related L. latifolium and L. graminifolium by its whole appearance.

25. **L. persicum** Boiss., Ann. Sc. nat., Botanique (1842) 196; Boiss., Fl. Or. I (1867) 360.

Perennial, glaucous, glabrescent; stem virgate, almost leafless, dichotomously (divaricately) branching from base; radical leaves petioled, oblong-lanceolate, scantily and acutely dentate, cauline leaves subulate, minute. Fruiting raceme elongated; silicle minute, ovate, glabrous; stigma sessile.

Centr. Asia: Mtn. Turkm. **Gen. distr.:** Iran. Described from Isfahan. Type in Geneva.

Note. Closely related to L. lacerum C. A. M. and may possibly be its southern race, but stems are nearly leafless, leaves are dentate not incised, and stigma is sessile.

26. **L. karataviense** Rgl. et Schmalh. in A. H. P. V, 1 (1877) 242.

Perennial, cespitose, low; leaves gray-pubescent; stem thin, branching, glabrous; radical leaves congested, pinnatisect, lobes spreading, subulate-linear, opposite or alternate, cauline leaves usually entire, subulate-linear, 520 spreading; pedicels ascending, filiform, completely glabrous, slightly shorter than the flowers [sepals] and nearly half as long as the white, obovate petals; silicles oval-suborbicular, slightly emarginate at apex, glabrous; style very short, scarcely exceeding the notch.

Centr. Asia: T. Sh. (W.). Endemic. Described from the Kara-Tau and Balakshiat mountains. Type in Leningrad.

Note. Related to L. caespitosum Desv. and L. meyeri Claus. The former is distinguished by its entire lower leaves, simple stem, acute and oval, netted-veined silicles, and style exceeding the notch. The latter is distinguished by its glabrous leaves, pubescent pedicels, and by acute, subcordate-oval silicles with a short style.

27. **L. turczaninovi** Lipsky in Zap. Kiev. Obshch. Est. XIII (1894) 412; N. Busch in Fl. cauc. crit. III, 4 (1907) 115. – L. lyratum ssp. lacerum var. turczaninowii Thell., Gatt. Lepid. (1906) 166, 169.

Perennial, low-growing plant, 15–20 cm high, glaucous, completely glabrous, ligneous at base; root squamose at summit with old decayed leaves; stem rather stout, strongly paniculately branching, branches divergent; leaves thick, radical leaves bipinnatipartite, with apical segment, broad-linear, lateral segments 4–6, pinnatipartite, rarely entire, narrowly linear; other leaves few, linear, entire, 2–3-toothed or pinnatipartite. Racemes short, flowers crowded at onset; pedicels thick; sepals orbicular, green, glabrous, white-hyaline at margin; petals white, orbicular, oval, short-clawed, 2 times longer than sepals, 2.5 mm long; silicles 3–3.5 mm long, 2.75–3 mm broad, orbicular-oval, slightly emarginate at base, subacute at apex; style null; seeds ellipsoidal, up to 2 mm long, 1.25 mm broad, bilaterally 2-striate. June. (Plate XXIX, Figure 3).

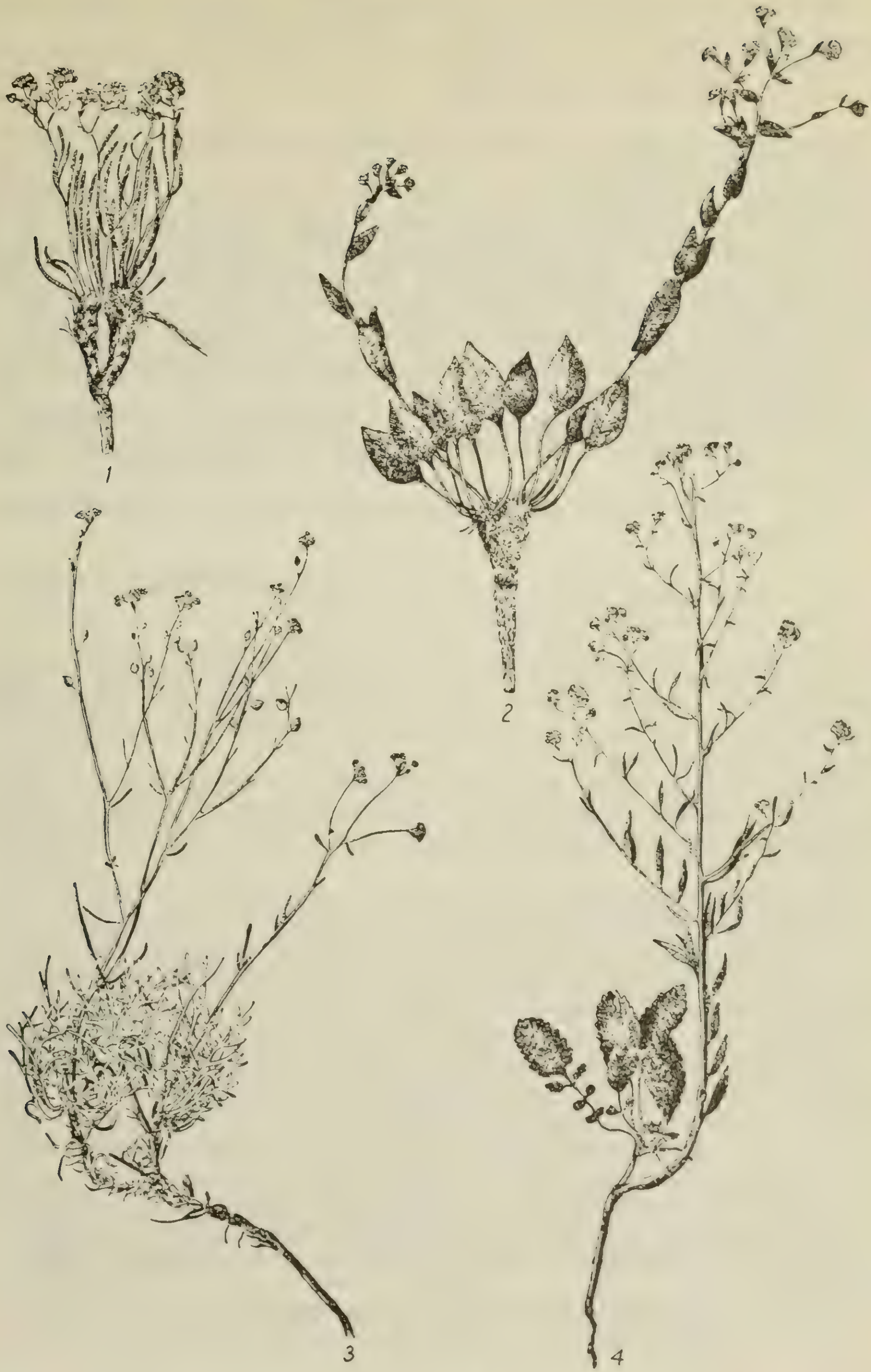

PLATE XXIX. 1 – Lepidium pumilum Boiss. et Bal.; 2 – L. crassifolium W.K.; 3 – L. turczaninovi Lipsky; 4 – L. lyratum L.

Dry hills. — European part: Crim. (Feodosiya). Endemic. Described from clayey sea bluffs near Feodosiya. Type in Leningrad.

Note. This species, which is very similar to L. meyeri Claus, is endemic in the environs of Feodosiya.

28. **L. meyeri** Claus, Localfloren der Wolga-Gegenden II (1851) 286; Shmal'g., Fl. I (1895) 99.

523 Perennial, whitish-glaucescent, rarely short-pubescent undershrub, with woody stems branching from base, 30—40 cm high; leaves thick, radical leaves simple, linear, dentate or pinnatipartite, cauline leaves linear, entire or the lower partite. Racemes at first corymbose later elongating; pedicels erect, pubescent, longer than fruit; sepals orbicular, pubescent, broadly white-margined; petals cuneate-obovate, 2 mm long, slightly longer than calyx; silicles obtuse at base, slightly cordate, oval, acute, with obsolete style, up to 3 mm, glabrous. June—July.

Chalky mountains. — European part: L.-Don, Transv., L. V. Endemic. Described from chalky mountains of Belaya Glinka near Stalingrad. Type in Leningrad.

Note. Endemic plant of the chalky slopes in the south European part of the USSR.

29. **L. coronopifolium** Fisch., Cat. Hort. Gorenk. ed. 1 (1808) 79; Ldb., Fl. Ross. I, 203; Shmal'g., Fl. I, 98.

Perennial, glabrous; stem erect, 40—60 cm high; radical leaves lanceolate-linear, runcinate-incised or dentate, cauline leaves linear, entire. Inflorescence paniculately branching; sepals long persistent; petals nearly twice as long as the sepals, 2.5 mm long; silicles 2.5 mm long, oval, short-pubescent; style 1 mm long. May—June.

Solonetzes. — European part: Transv., L. V.; W. Siberia: U. Tob., Irt.; Centr. Asia: Balkh., Syr D., Amu D. **Gen. distr.**: Iran. Described from specimens grown in the Botanical Garden in Gorenki. Type in Leningrad.

30. **L. soongoricum** Schrenk in Fisch. et May., Enum. I pl. Schrenk. (1841) 98; Ldb., Fl. Ross. I, 765; Kryl., Fl. Zap. Sib. VI (1931) 1266.

Perennial, glabrous; stem erect, 25—50 cm high, diffusely branching; leaves entire, lower leaves sometimes crowded at base of stem, lanceolate or linear-lanceolate, acute, 3—6 cm long, 5—8 mm wide, with petioles 1.5—3 cm long, middle and upper leaves sessile, smaller, linear. Flowers crowded in short corymbose apical racemes, forming a broad, corymbose-paniculate inflorescence; sepals orbicular-elliptic or suborbicular, 1—1.5 mm long, green in the middle, broadly white-margined; petals 2 times longer than sepals, orbicular, tapering into a claw nearly as long as or slightly shorter than the blade, 2—2.5 mm long; stamens 6; style (without stigma) one-half to one-third as long as ovary; silicles broadly elliptic, ca. 2 mm long. May.

Solonetzes. — W. Siberia: Alt., U. Tob., Irt.; Centr. Asia: Ar.-Casp. Kyz. K., Syr D. Endemic. Described from Arkalyk Mountain. Type in Leningrad.

Note. Species related to L. coronopifolium Fisch.

524 31. **L. graminifolium** L., Syst. nat. ed. 10, II (1759) 1127; Sp. pl., ed. 2, II (1763) 900; Ldb., Fl. Ross. I, 208; Shmal'g., Fl. I, 99; N. Busch in Fl. cauc.-crit. III, 4 (1907) 116.— Ic.: Lam., Encycl. Ill. II, 2 (1794) tab. 556, f. 1; Sibth. et Sm., Fl. Graeca VII (1830) tab. 618; Rchb., Ic. Fl. Germ. tab. X, f. 4218.— Exs.: Fl. cauc. exs. No. 62; HFR No. 1705.

Perennial, subglabrous or glabrous, 30—60 cm high, erect, profusely branching with erect or spreading branches; radical leaves oblong-spatulate, crenate-serrate or incised at base, sparingly pilose; middle cauline leaves linear-lanceolate or slightly spatulate, dentate or entire, upper leaves usually linear, subobtuse, entire, rather narrowly white-margined; petals white, 1.5 mm long, 1.5 times longer than calyx, obovate-spatulate, short-clawed. Fruiting racemes elongated; pedicels ascending-erect; silicles 2.5—3 mm long, 1.75—2 mm broad, oval, rounded-subobtuse at base, acute at apex, nearly wingless, glabrous, style very short; seeds narrowly ovate, more or less flattened, nearly smooth, immarginate, dark rufous. June.

Dry slopes.— European part: Crim. **Gen. distr.:** Centr. Eur., Med., Bal. Introduced into Belgium. Described from Europe. Type in London.

Note. A Mediterranean species.

Genus 663. **STROGANOVIA** * KAR. et KIR. **

Kar. et Kir. in Bull. Soc. Natur. Mosc. XIV (1841) 386; ibid. III (1842) 534 in add. emend.

Sepals suberect or ascending, not saccate at base, more or less broadly hyaline at margin. Petals white, pinkish, or seldom pale yellow; blade broadly oval or orbicular, rounded or slightly emarginate at apex, gradually tapering toward base into a narrow linear claw. Filaments free, edenticulate. Two nectariferous glands at the middle stamens, small, orbicular, or oval, four at the lateral stamens, larger, suborbicular, tetragonous or triangular, all entire or seldom with thick appendages at margin. Ovary subsessile or borne on a very short thick gynophore; style short or conically elongated; stigma small, capitate, rarely sessile. Fruit an obovate silicle, tapering at both ends or only toward base, subobtuse at apex, coriaceous, inflated, rarely slightly flattened, valves with abruptly exserted thick midrib and more or less conspicuously netted-veined. Septum broad, orbicular or oval, stoutish, entire, nerveless, with numerous large epidermal cells transversely
525 undulate or rugose. Seeds pendulous, 1 in each cell, very large, ovate or elliptic, smooth. Cotyledons thick, conduplicate, embryo notorrhizal (rarely oblique or nearly pleurorhizal in some of seeds).— Perennial herbs, with thick multicipital root producing short shoots, rosetted leaves and 1—3 floriferous stems. Leaves entire, thick, coriaceous.

1. Stems rounded, sulcate, thin, 2—4 mm broad at base; lower cauline leaves petioled (Section Petiolatae N. Pav.) . . . . 2.
+ Stems angular, thick, 5—12 mm broad at base; cauline leaves sessile (Section Sessiles N. Pav.) . . . . 7.
2. Middle and upper cauline leaves tapering toward base, sessile, not amplexicaul and not auricled at base . . . . 3.

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* After S.G. Stroganov, chairman of the Moscow Society of Naturalists.

** Treatment by N.V. Pavlov.

+ Middle and upper cauline leaves sessile, amplexicaul, with rounded or acuminate auricles at base . . . . 6.

3. Radical and lower cauline leaves orbicular-cordate, emarginate or truncate at base; flowers pinkish, pedicels short-pubescent . . . . 1. **S. cardiophylla** N. Pav.

+ Radical and lower cauline leaves tapering toward base . . . . 4.

4. Radical and lower cauline leaves very narrow, lanceolate or linear-lanceolate, long-acuminate at both ends; flowers white, pedicels with long curly hairs . . . . 4. **S. affghana** (Boiss.) N. Pav.

+ Radical and lower cauline leaves oblong-spatulate, ovate or oval-lanceolate, subobtuse at both ends; pedicels usually glabrous (if sometimes pubescent, then flowers pinkish) . . . . 5.

5. Leaves serrulate at margin, rarely entire; flowers pinkish, sepals long persistent, narrowly white-hyaline at margin; silicles elliptic, rounded at apex . . . . 2. **S. paniculata** Rgl. et Schmalh.

+ Leaves entire; flowers white, sepals soon caducous, broadly white-margined; silicles smaller, obovate, emarginate at apex . . . . ★ 3. **S. persica** N. Busch.

6. Radical and lower cauline leaves broad, elliptic or oval, sometimes lyrate at base with rounded pinnate lobes, middle and upper cauline leaves semiamplexicaul, broadly auricled; flowers pale yellow . . . . 5. **S. subalpina** (Kom.) N. Pav.

+ Radical and lower cauline leaves lanceolate or oblong-lanceolate, 526 without lobes at base, middle and upper cauline leaves sagittate-amplexicaul, with long, narrow, linear, acuminate auricles . . . . 5. **S. sagittata** Kar. et Kir.

7. Stigma sessile or style very short, not longer than 0.5 mm; radical leaves usually ovate or broad-lanceolate . . . . 8.

+ Style longer, 1—3 mm, even when immature style half as long as breadth of silicles; radical leaves mostly spatulate or orbicular-spatulate, seldom lanceolate . . . . 9.

8. Stigma sessile; stem strongly acutely angular; radical leaves broadly ovate or oval-lanceolate, sometimes suborbicular, cauline leaves not auricled; sepals glabrous; silicles obovate, with obtuse valves 3—4 mm long, sessile . . . . 7. **S. gracilis** N. Pav.

+ Stigma sometimes sessile, often with short style up to 0.5 mm long; stem subterete-angular; radical leaves broad-lanceolate, cauline leaves with rather large, orbicular auricles; sepals often dorsally pubescent; silicles ovate or ovate-lanceolate, much larger, 7—12 mm long, with carinate valves, tapering at base and often borne on a short, thick, fruit stipe . . . . 8. **S. intermedia** Kar. et Kir.

9. Radical leaves rather narrow, lanceolate, tapering toward base into a rather narrow, broadly-winged petiole, cauline leaves sessile, with short, rounded auricles; pedicels thin, silicles orbiculars small, 3—5 mm long . . . . 9. **S. litvinovi** Lipsky.

+ Radical leaves orbicular or rotund-spatulate, with very short and broadly-winged petioles, cauline leaves not auricled, slightly decurrent or with very short rounded auricles; pedicels thick, strict; silicles larger, 6—12 mm long . . . . 10.

10. Plant relatively tall, 30—50 cm high, stem and pedicels glabrous; silicles tapering at base into a short fruit stipe, 6—8 mm long, valves with distinct midrib, style up to 1 mm long, nectariferous glands fringed . . . . 11.

+ Plant low, 15—20 cm high, stem and pedicels sparsely long-hairy; silicles sessile or subsessile, large, 10—12 mm long, valves with robust midrib and distinctly prominently netted-veined, style subulate-conical, 3—4 mm long, nectariferous glands entire . . . . 12. **S. robusta** N. Pav.

11. Leaves broad, obtuse at apex, without prominent midrib . . . . 10. **S. brachyota** Kar. et Kir.

+ Leaves short-acuminate, with a distinct midrib . . . . 11. **S. trautvetteri** Botsch.

527 Section 1. **PETIOLATAE** N. Pavl. — Plants with rounded, sulcate stems, thin, 2—4 mm broad; lower cauline leaves with rounded or grooved petioles.

1. **S. cardiophylla** N. Pavl. in Journ. Bot. de URSS 5 (1933) 364. — S. crispulifolia M. Pop. (nomen) in sched. Herb. Horti Petrop.

Perennial, green plant; stems glabrous, thin, sulcate, 40—80 cm high, paniculately branching with thin, arcuate branches; radical and lower cauline leaves coriaceous, simple, cordate-orbicular, deeply emarginate or truncate at base, with long, sulcate petioles as long as or longer than blades, rounded at apex, slightly crisp-lanate at margin, glabrous on both sides, with broad subobtuse notches, lobes obtuse, orbicular, slightly prominently veined above, sharply so beneath, and with 3 thicker nerves palmately divergent into thinner lateral netted veins; middle leaves broadly lanceolate, tapering at both ends, with much shorter petioles, upper leaves narrowly lanceolate, subsessile, entire. Pedicels thin, short-pubescent; flowers small, 1.5—2 mm long; sepals deciduous, ovate, subobtuse, often dorsally pubescent and narrowly white-margined; petals twice as long as sepals, pink, broadly ovate; slightly truncate or orbicular at apex, narrowly clawed; median nectariferous glands (of middle stamens) small, orbicular, lateral glands suborbicular, angular, larger; silicles obovate, large, 6—7 mm long, 3—4 mm broad, glabrous, rounded at apex, with a rather long style, 0.8—1 mm, valves rather hemispherically inflated, convex, with obscure midrib, cells 1-seeded; seeds oval, large, smooth. June—July.

Steppes and meadows of mountain slopes. — Centr. Asia: Syr D. Endemic. Described from the Mashat-Tau Mountains near the Syr Darya region. Type in Moscow, cotype in Leningrad.

2. **S. paniculata** Rgl. et Schmalh. in A. H. P. V, 1 (1877) 242; Korsh., Bull. Acad. St. Pétersb. IX, 5 (1898) 418, emend.

Perennial, green or somewhat glaucescent plant; stems glabrous, sulcate, 50—120 cm high, paniculately branching above with thinner flexuous branches; radical leaves broadly lanceolate or ovate-lanceolate or ovate, tapering at both ends, with long, wingless, angular or sulcate petioles nearly as long as or shorter than blade, coriaceous, simple, obtusely acuminate, slightly crisp-lanate at margin, entire or slightly obtusely denticulate, glabrous on both

sides or rarely sparsely short-white hairy beneath, with 3 palmately divergent, thick nerves, slightly prominent above, more distinctly so beneath, and thinner lateral netted veins; lower cauline leaves similar to the radical but petioles shorter, middle leaves lanceolate or oblong-lanceolate, auricled
528 or not, upper leaves small, obovate, hardly tapering toward base, sessile, semiamplexicaul, entire. Pedicels thin, glabrous or rarely with long white hairs, the lower falling, the upper subumbellate, longer than calyx but much shorter than silicles, only partly bearing fruit; flowers rather large, 5–6 mm long; sepals rather long persistent, falling later, ovate, subobtuse, glabrous or seldom dorsally long, crisp-pubescent, narrowly white-hyaline or purple-colored at margin; petals 2–3 times longer than sepals, pink or purple, rarely white or pale yellow, broadly oval or suborbicular, rounded at apex, tapering at base into a narrow claw; median nectariferous glands (or middle stamens) small, orbicular, lateral glands suborbicular, larger; silicles obovate, large, 5–7 mm long, 3–4 mm broad, glabrous, acuminate, with sessile or subsessile stigma, valves rather hemispherically inflated, with 1 stout midrib, carpels 1-seeded; seeds ovate, large, smooth. June–July.

Steppes and meadows of mountain slopes.— Centr. Asia: Syr D., Pam.-Al. Endemic. Described from the Syr Darya region. Type in Leningrad.

Note. A rather polymorphic species varying in size and color of flowers and in pubescence which is absent in type but is usually rather developed. In a supplementary diagnosis, Korzhinskii indicated that the petals are white, but in most cases they are pink or purple.

★ 3. **S. persica** N. Busch in Journ. Soc. Bot. de Russie XI, 1–2 (1926) 225.— Ic.: N. Busch, l. c., tab.

Perennial, glaucous plant; stems glabrous, sulcate, 50–80 cm high, paniculately branching above with thinner, flexuous branches; radical leaves ovate or ovate-lanceolate, with long, rounded-sulcate petioles longer than or as long as the blades, coriaceous, obtuse at apex, short-tapering toward base, sparingly crisp-lanate at margin, entire, glabrous on both sides, with 3 thick longitudinal, palmate nerves somewhat prominent above, sharply so beneath and thinner, lateral netted veins; lower cauline leaves similar to the radical much shorter-petioled, middle leaves smaller, spatulate or oblanceolate, tapering toward base into a more or less long petiole, sparsely hairy at margin, uppermost leaves small, linear-oblong, more densely covered with long, fine hairs. Pedicels thin, glabrous; flowers small, 2–4 mm long; sepals deciduous, oval or orbicular-elliptic, glabrous, with thick prominent nerves, broadly white-margined; petals
529 twice as long as sepals, white, broadly oval or suborbicular, with thick, conspicuous nerves, rounded at apex, tapering at base into a short, narrow claw; median nectariferous glands (of middle stamens) small, triangular, lateral glands larger, crescent-shaped, with a longitudinal appendage directed toward the ovary; silicles obovate, often oblique, small, 4–5 mm long, 3–4 mm broad, emarginate at apex and with a sessile or subsessile stigma, valves strongly inflated, 1-nerved, carpels 1-seeded, only 1 carpel developed in the oblique silicles; seeds ovate, large, smooth. June–July.

Sterile, dry solonetzic slopes of desert mountains.— Unknown within the range of the Soviet Union; however, it may be found in southern Transcaucasia. **Gen. distr.:** Iran. Described from Iran. Type in Leningrad.

4. S. **affghana** (Boiss.) N. Pavl. comb. nova. — Lepidium affghanum Boiss., Fl. Or. I (1867) 358. — Nasturtium affghanicum O. Kntze., Revis. I (1891) 937.

Perennial, glabrous, gray-green plant; stem covered at base with fibrous decayed leaves, sulcate, 50—90 cm high, long and loosely branching, at summit with thinner, flexuous branches; radical leaves narrowly lanceolate or lanceolate-linear, rigid, coriaceous, with long, sulcate-triangled, wingless petioles longer than or as long as blade, long, narrowly acuminate, entire, glabrous on both sides, with longitudinal midrib somewhat prominent above, sharply so below, and lateral, sharply divergent netted veins; cauline leaves similar to the radical, gradually reduced toward summit, lower leaves with shorter petioles, upper leaves sessile or subsessile, tapering toward base, without auricles. Pedicels thin, elongate, with fine and long, whitish, crisp hairs; flowers small, 1.5—2 mm long; sepals broadly oval or orbicular-elliptic, dorsally covered with short, crisp hairs, broadly white-hyaline at margin; petals 1.5—2 times longer than sepals, white, broadly oval, rounded at apex, tapering at base into a very short, narrow claw; median nectariferous glands (of middle stamens) small, orbicular, lateral glands larger, triangular-cordate, subobtuse; silicles obovate, small, 4—5 mm long, 3—4 mm broad, often oblique, subobtuse at apex and with sessile or subsessile stigma, valves slightly inflated, with one slightly carinate nerve, carpels 1-seeded, only one seed develops in oblique silicles; seeds ellipsoidal, slightly triangular, with rounded ribs, large, smooth. May—June.

Dry stony slopes of desert mountains. — Centr. Asia: Mtn. Turk. **Gen. distr.:** Iran. Described from Afghanistan. Type in Geneva.

Note. An unusually rare plant, occurring only in Turkmenistan near Gaudan in the district of Ashkhabad. It is possible that the original specimen of Bunge from which Boissier made his diagnosis is lost.

530 5. S. **subalpina** (Kom.) Thell., Neue Denkschr. d. Schweiz. Naturf. Gesellsch. XLI (1907) 318. — Lepidium subalpinum Kom., Trav. Soc. sc. natur. Pétersb. XXVI (1896) 108; Lipsky in A. H. P. XVIII, 1 (1900) 15 emend.

Perennial, glabrous, green plant; stems thin-sulcate, 40—100 cm high, branching from the middle or from summit; radical leaves rigid, coriaceous, elliptic or ovate, large, rounded at apex or shortly subobtuse-acuminate, tapering at base into a wingless, sulcate petiole distinctly shorter than blade, entire (sometimes blade slightly lyrate with short, obtuse, pinnate basal lobes), slightly wavy or sparingly and obtusely crenate, with midrib slightly prominent above, sharply so beneath, and lateral netted veins disappearing toward margins; lower cauline leaves similar to the radical leaves but much shorter-petioled, middle and upper leaves slightly reduced, oblong or oblanceolate, sessile, all leaves dilated at base of petioles or blades, amplexicaul, with wide, rounded, seldom acuminate auricles. Pedicels thin, long, glabrous or sparsely covered with crisp hairs; flowers rather large, 5—6 mm long; sepals soon deciduous, oval or orbicular-elliptic, glabrous or rarely with crisp hairs on the outer face, yellow, narrowly hyaline at margins and apex; petals 2—3 times longer than sepals, pale yellow or white, obscurely nerved, broadly oval or suborbicular, rounded at apex, tapering at base into a narrow claw; median nectariferous glands (of middle stamens) small, rounded, lateral glands larger, rhombic-tetragonous, subobtuse; silicles obovate or elliptic, small, 4—5 mm long, 3—4 mm broad, acuminate, with a very short style 0.5–1 mm long, valves strongly inflated with midrib and thick lateral netted veins, carpels 1-seeded; seeds elliptic, large, smooth. July–August.

Subalpine meadows, stony slopes, and among weeds in passes not lower than 1,000 m. Centr. Asia: Syr D., Pam.-Al. Endemic. Described from the upper reaches of the Zeravshan (Kara-Kul VII 1892). Type in Leningrad.

Note. Seeds with a notorrhizal radicle are predominant in this unique species; however, Lipsky already noticed a few seeds with oblique and even pleurorhizal radicles. This has also been observed in some other species of the genus and, in our opinion, indicates that it is very ancient.

6. **S. sagittata** Kar. et Kir. in Bull. Soc. Nat. Mosc. XIV (1841) III, 387; Ldb., Fl. Ross. I, 770.

Perennial, glabrous, green plant; stems sulcate, 40–80 cm high, branching above with thin flexuous branches; radical leaves broadly lanceolate or
531 oblong-lanceolate, with long, wingless, angular petioles longer than or as long as blade, short, obtusely acuminate, entire or sparsely and obtusely crenate; lower cauline leaves similar to radical leaves but much shorter-pediceled, middle and upper leaves broadly lanceolate, reduced, sessile, sagittate and amplexicaul at base, with attenuate, linear, acuminate auricles. Pedicels long, thin, glabrous; flowers rather large, 5–6 mm long; sepals oblong-ovate, glabrous, very narrowly white-hyaline at margins and apex; petals 2–3 times as long as sepals, white, broadly oval or suborbicular, rounded at apex, tapering at base into a narrow claw; median nectariferous glands (of middle stamens) small, orbicular, lateral glands larger, suborbicular; immature silicles obovate, small, 2–3 mm long, 1–2 mm broad, acuminate, with very short style, 0.5–1 mm, valves slightly inflated, with a longitudinal midrib, carpels 1-seeded. May–June.

Arid sandy steppes. — Centr. Asia: Dzu.-Tarb. Endemic. Described from Tarbagatai. Type in Leningrad.

Note. One of the rarer species of the flora of the USSR. With the exception of the numerous specimens collected by Karelin and Kirillov, there has been no other material available; the plant was never found again.

Section 2. **SESSILES** N. Pavl. — Plant with angular, thick stems, 5–12 mm broad at base, lower cauline leaves sessile and amplexicaul or with very short and broadly winged petioles and semiamplexicaul.

7. **S. gracilis** N. Pavl. in Journ. Bot. USSR (1933) 365.

Perennial, gray-green glabrous plant; stems thick at base, thinner above, strongly and acutely angular, nearly winged, deeply sulcate, 20–35 cm high, branching from base or above, branches thin, flexuous; radical leaves numerous, rigid, coriaceous, broadly oval, suborbicular or ovate-lanceolate, tapering at base into a very short, broadly-winged petiole, shortly acuminate, glabrous on both sides, with a sharply prominent midrib beneath and lateral, thin, netted veins, entire; cauline leaves gradually reduced, broadly lanceolate or oblong, sessile, semiamplexicaul, not auricled at base. Pedicels thin, glabrous, all floriferous, nearly as long as flowers, elongating in fruit, 2–3 times as long as silicles; flowers small, 4–5 mm long; sepals

caducous, broadly ovate, obtuse, glabrous, with a broadly white-hyaline margin; petals twice as long as sepals, white, obovate or suborbicular, rounded at apex, tapering at base into a narrow, short claw; median nectariferous glands (of middle stamens) small, ovate-triangular, lateral glands larger, obtusely tetragonous; silicles obovate, small, when immature
532 3–4 mm long, 2–3 mm broad, glabrous, slightly flattened, tapering at base, subobtuse at apex, with sessile stigma, valves somewhat plane to convex, with obscure midrib. May–June.

Stony slopes and taluses of desert mountains.— Centr. Asia: T. Sh. (W.). Endemic. Described from Syr Darya Kara-Tau. Type in Moscow.

Note. A unique small-fruited species resembling S. persica N. Busch, representing apparently an example of convergence.

8. **S. intermedia** Kar. et Kir. in Bull. Soc. Nat. Mosc. XV (1842) 162; Ldb., Fl. Ross. I, 770.— Lepidium kirilovi Trautv. in Bull. Soc. Nat. Mosc. I (1860) 131.— Exs.: Kar. et Kir. (1841) No. 1263.

Perennial, gray-green, glabrous plant; stems thick, rounded-angular, sulcate, 25–50 cm high, covered at base with fiberous old decayed leaves, branching from the middle with thinner, arcuate-flexuous branches; radical leaves broadly lanceolate or oblong-lanceolate, tapering at base into a very short, broadly-winged petiole, long-acuminate, entire, glabrous on both sides, with sharply prominent, thick midrib beneath and thinner, lateral netted vein; lower cauline leaves resembling radical leaves, sessile, semiamplexicaul, middle and upper leaves slightly reduced, sessile, dilated at base, amplexicaul, with rounded, obtuse, more or less large auricles. Pedicels glabrous, spreading in fruit, as long as or longer than silicles, rigid, slightly thickened above; flowers rather large, 5–6 mm long; sepals caducous, oval or oblong-ovate, glabrous, narrowly white-hyaline at margins and apex; petals 2–3 times as long as sepals, white, broadly oval or suborbicular, rounded at apex, tapering at base into a narrow claw; median nectariferous glands (of middle stamens) small, crescent-shaped, with subobtuse appendages, lateral glands larger, obtusely tetragonous; silicles obovate, large, 5–12 mm long, 3–7 mm broad, glabrous, slightly flattened, tapering toward base, sessile or rarely borne — on same plant — on a short, thick stipe, subobtuse at apex, stigmas sessile or on 0.5 mm long styles; valves rather strongly inflated, with a thick midrib and distinctly prominent lateral netted nerves, nerves often carinate, carpels 1-seeded; seeds elliptic, large, glabrous. June–July.

Stony and dry mountain slopes in steppes.— Centr. Asia: Balkh., T. Sh., Dzu.-Tarb. Described from Dzungarian Ala-Tau. Types in Leningrad and Moscow.

533 9. **S. litvinovi** Lipsky in A. H. P. XXVI (1910) 121.— S. intermedia Litv. in Trav. Mus. Bot. Ac. St.-Pétersb. I (1902) 43, non Kar. et Kir.; N. Busch in Journ. Soc. Bot. Russe XI, 1–2 (1926) 227, p. p. quoad locum Kopet-dagh.

Perennial, low, gray-green glabrous plant; stems rounded-angular, thick at base, sulcate, branching from middle or above with thinner, flexuous branches; radical leaves broadly lanceolate, somewhat rigid, coriaceous, tapering at base into a short, broad, winged to base petiole, shortly obtuse-acuminate, with a very short mucro, glabrous on both sides, beneath with a strongly prominent midrib and thinner lateral netted nerves diverging in acute angles; lower cauline leaves similar to the radical, tapering toward base, sessile, semiamplexicaul, middle and upper leaves slightly reduced, sessile, dilated at base, subamplexicaul, with suborbicular or rarely acuminate auricles. Fruiting pedicels longer than silicle, glabrous or sparingly pubescent with long, whitish, crisp hairs; flowers small, 4—5 mm long; sepals soon caducous, broadly ovate or oblong-ovate, obtuse, dorsally slightly crisp-pubescent, broadly white-hyaline at margins; petals 2—3 times as long as sepals, white, broadly oval to oblate, rounded at apex, tapering at base into a short narrow claw; median nectariferous glands (of middle stamens) small, oblate, lateral glands larger, triangular-cordate, subobtuse; silicles orbicular, small, 3—4 mm long and broad, glabrous, slightly tapering or rounded at base, rounded at apex, with relatively long style, 0.8—1 mm, valves hemispherically inflated, with thick, longitudinal midrib and obscure lateral netted nerves; seeds rounded, large, smooth. May—June.

Stony dry slopes of desert mountains. — Centr. As.: Mtn. Turkm. **Gen. distr.:** Iran. Described from the Transcaspian area. Type in Leningrad.

10. **S. brachyota** Kar. et Kir., Bull. Soc. Nat. Mosc. XVI, III (1841) 387; Ldb., Fl. Ross. I (1842) add. 770. — Lepidium? desertorum Schrenk ex Fisch. et May., Enum. pl. Schrenk. I (1841) 99. — Exs.: Kar. et Kir. (1840) No. 124; (1841) No. 1264.

Perennial, low, gray-green glabrous plant; stems rounded-angular, thick at base, densely covered with fibrous old decayed leaves, sulcate, 30—50 cm high, widely branching from middle or above with thinner, flexuous branches; radical leaves spatulate or orbicular-spatulate, rigid, coriaceous, tapering at base into a very short, broadly-winged petiole, shortly obtuse-acuminate, with a very short subobtuse mucro, entire, cartilaginous at margin, glabrous on both sides, with longitudinal, thick, palmately divergent nerves slightly prominent above, more sharply so beneath, and thinner netted nerves; lower
534 cauline leaves similar to radical leaves but with much shorter, semiamplexicaul, broadly-winged petioles or sessile, middle and upper leaves reduced, ovate-lanceolate, sessile, dilated at base, subamplexicaul, with rounded, obtuse auricles. Pedicels 1.5—2 times as long as silicles, rigid, somewhat thickened above, glabrous; flowers rather large, 4—6 mm long; sepals caducous, broadly oval or suborbicular, obtuse at apex, glabrous, broadly white-hyaline at margins and apex; petals twice as long as sepals, white, broadly oval or suborbicular, rounded at apex, tapering at base into a narrow claw; nectariferous glands (of middle and lateral stamens) equal, rounded, with short thickish appendages at margins; silicles obovate, large, 6—8 mm long, 4—5 mm broad, glabrous, tapering toward base, borne on a short, thick stipe, subobtuse at apex with a rather long style, 1 mm, valves subhemispherically inflated, with a longitudinal, thick midrib and obscure lateral netted nerves, carpels 1-seeded; seeds oval, large, very slightly tubercled. May—June.

Stony and steppe slopes of desert mountains. — Centr. Asia: Balkh., Dzu.-Tarb. Endemic. Described from the former Semipalatinsk Region. Type in Leningrad.

11. **S. trautvetteri** Botsch. in Addenda VII, p. 489.

Perennial; root usually with several rosettes and stems at summit; stems 15—30 cm high, 3—5 mm in diameter at base, glabrous, sulcate, cylindrical; rosette leaves erect, flat, 2.5—6 cm long, 0.7—2 cm broad, glaucescent, oblong-obovate, broadly cuneate at base (subsessile), acuminate; midrib at lower side of leaves markedly thicker than the others; cauline leaves sessile, somewhat decurrent, almost spatulate, shortly acuminate, obsoletely round-auricled, midrib thicker than the others. Pedicels glabrous, as long as fruit; fruit (with style) 5—9 mm long, style 1—1.5 mm long; valves with conspicuous midrib; seeds straw-colored, ovate, ca. 3 mm broad and 4.5 mm long. July—August.

Solonetzes.— Centr. Asia: Balkh. Endemic. Described from Balkhash. Type in Leningrad.

Note. A very rare plant, collected only twice — once by Schrenk in 1843 near Lake Balkhash, and the second time in 1933 by Mironov in eastern Bet-Pak-Dala between the Kobzda well and the Kempyr-Mol burial grounds. The first to mention it, without a name, was Trautvetter in the Bull. Soc. Nat.
535 Mosc. XXXIII (1860) 124. It is distinguished from S. brachyota Kar. et Kir. by having narrower, more acuminate leaves with midrib thicker than the lateral veins; whereas in S. brachyota the parallel nerves on the leaves are almost equal in thickness and the leaves are broadly obtuse-rounded at apex. It is distinguished from S. gracilis Pavl. by its longer style. It is related to S. intermedia Kar. et Kir. but the latter's rosetted leaves are lanceolate and long-petioled, recurved at apex, and the cauline leaves are acutely triangular, recurved (bent). All three species have thicker stems and are taller than S. trautvetteri.

12. **S. robusta** N. Pavl., Journn. Bot. de URSS (1933) 367.— Exs.: N. Pavl. et S. Lipsch., Fl. Turk. exs. (1932) No. 56 (sub. S. brachyota err.).

Perennial, gray plant; stems firm, low, 15—20 cm high, obtusely angular, deeply sulcate, slightly flexuous, strongly branching from base, together with branches, inflorescence and pedicels sparsely covered with long, whitish hairs; radical leaves numerous, thick, compact, coriaceous, broadly rotund spatulate, orbicular-elliptic or spatulate, tapering at base into a very short, broadly-winged petiole, rounded at apex, sometimes with a small mucro, glabrous on both sides, with longitudinal, thick, divergent nerves slightly prominent above, sharply so beneath, and thinner convergent veins, broadly white or brownish cartilaginous-hyaline at margin; cauline leaves few, 3—4, obovate or broadly lanceolate, sessile, semiamplexicaul, slightly decurrent from margins. Pedicels shorter than or as long as silicles; sepals deciduous, broadly oval, obtuse, white-hyaline at margin; median nectariferous glands [of middle stamens] very small, rounded, lateral glands larger, suborbicular-triangular, entire; silicles obovate, somewhat oblique, obtuse angular, large, 10—12 mm long, 7—8 mm broad, with very long, 3—5 mm, subulate-conical, thick style; valves spherically convex, stout, with a thick conspicuous midrib and thinner, yet conspicuous lateral netted nerves; carpels 1-seeded; seeds oval, large, 6—7 mm long, smooth. May—June.

Gravelly and rocky slopes of desert mountains.— Centr. Asia: T. Sh. (W.). Endemic. Described from Syr Darya Kara-Tau. Type in Moscow.

Genus 664. **HYMENOPHYSA*** C. A. M.**

C.A.M. in Ldb., Fl.Alt.III (1831) 180.

Sepals spreading, not saccate. Petals shortly clawed, small, white. A crescent-shaped nectariferous gland at both sides of shorter stamens, 536 with short appendage directed toward the longer stamens forming a small gland in front of each pair of longer stamens. Ovary sessile, style elongate, stigma slightly 2-lobed. Fruit indehiscent, broadly obovate to suborbicular, slightly inflated. Valves nerveless, convex. Septum delicate, usually fenestrate. Seeds 1–2 in each cell, pendulous. Cotyledons conduplicate, radicle incumbent. Hairs simple.— Perennials with entire leaves, resembling in appearance species of Lepidium in Section Cardaria.

Near and Central Asian genus of three species, two of which occur within the Soviet Union. The third, H. fenestrata Boiss., is in Iran.

Note. Hymenophysa C.A.M. is close to Lepidium but in shape of its fruit it resembles Stroganovia.

1. Silicles pubescent . . . . 1. **H. pubescens** C. A. M.
+ Silicles completely glabrous . . . . 2. **H. macrocarpa** Franchet.

1. **H. pubescens** C. A. M. in Ldb., Fl. Alt. III (1831) 181; Ldb., Fl. Ross. I, 208, 765; N. Busch, Fl. Sib. et Or. Extr. I (1913) 107; Kryl., Fl. Zap. Sib. VI (1931) 1268.— Ic.: Ldb., Ic. II (1830) tab. 165; Schulz in E.-Pr. Nat. Pflzf. 17B (1936) 477, fig. 290.

Perennial, short-pubescent, grayish green plant; root creeping; stem branching nearly from base, 15–35 cm high; leaves oblong or lanceolate, irregularly sharply toothed; radical leaves tapering into a petiole, cauline leaves sessile, sagittate at base. Racemes short, corymbiform; sepals 1.5 mm long, pubescent; petals white, rounded, tapering at base into a claw, 3–4 mm long; silicles oval-globular, 4–5 mm long, 3.5 mm broad, pubescent, with short style (1–1.25 mm long). Fl. May–July.

Solonetzes.— W. Siberia: Alt., U. Tob., Irt.; Centr. Asia: Balkh., Ar.-Casp., Dzu.-Tarb. **Gen. distr.**: W. Mong. Described from Baraba steppe and Dzungaria semidesert. Type in Leningrad.

2. **H. macrocarpa** Franchet, Pl. du Turkest., Mission Capus in Ann. Sc. Nat. Bot. XV (1883) 233.

Perennial; stem branching at summit, thick as a crow's feather, erect, gray with short, recurved downy hairs or glabrescent; cauline, middle, and upper leaves very short-pubescent, ovate-oblong, obtuse, denticulate, sagittate-amplexicaul at base. Fruiting racemes short, completely glabrous; pedicels nearly as long as flowers, elongating after flowering, 8–15 mm long, longer than silicles; sepals ovate, obtuse, narrowly white at margins; 537 petals slightly longer than calyx, blade ovate-oblong, tapering into a narrow claw; style as long as ovary, stigma capitate, compressed; silicles completely glabrous, inflated, spherical-compressed, 1-nerved, 6–7 mm in diameter; style shorter than silicle, 1 mm long; carpels 1–2-seeded.

Centr. Asia: Amu D. Endemic. Described from Bukhara, Kudkuduk. Type in Paris.

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* From the Greek hymen – membrane, and physa – bladder.

** Treatment by N.A. Bush.

Note. H. macrocarpa is easily distinguished from H. fenestrata Boiss. by its spherical silicles and very short raceme, even in fruit. It is closer to H. pubescens C. A. M. because of its short raceme and spherical silicles. From both species it is clearly distinguished by glabrous silicles twice as large (4–5 mm long) and by the shape of its leaves.

Genus 665. **CORONOPUS** * (RUPP.) GAERTN.**

Rupp. ex L., Syst.ed.I (1735); Gaertn., Fruct.II (1791) 293; N. Busch in Fl.cauc.crit.III, 4 (1907) 118; Hayek, Crufic.-Syst. (1911) 289.

Sepals spreading, the lateral sometimes slightly saccate. Petals white, small or null. Filaments entire, free, the shorter stamens often absent, the median sometimes not cleft. A pyramidal nectariferous gland on both sides of shorter stamens and in front of each pair of the longer ones; if lateral stamens absent, then lateral glands missing; if, in addition, median glands not fissured, then with 2 small glands at each side. Ovary sessile. Style very short. Stigma capitate. Fruit with narrow septum, bilaterally compressed, indehiscent, geminate, bilocular. Valves closed, stout, rugose or tubercled. Carpels 1-seeded. Style very short. Seeds pendulous, spherical, one in each carpel. Embryo notorrhizal, cotyledons linear, conduplicate, attached above curved embryo. Hairs simple. — Annuals or biennials, prostrate at base, many-branched, with pinnate leaves and capitate, opposite-leaved racemes.

Of the 12 species of this essentially subtropical, universally distributed genus, two occur in the Soviet Union, one of which was introduced by man.

1. Pedicels shorter than flowers and fruit. Petals white, slightly longer than calyx. Silicles reniform, with style . . . . . 1. **C. procumbens** Gilib.
+ Pedicels longer than flowers and fruit. Petals yellowish, shorter than calyx. Silicles oblate, notched at apex, style null . . . . 2. **C. didymus** (L.) Sm.

538 1. **C. procumbens** Gilib., Fl. Lithuan. IV (1782) 92; N. Busch in Fl. cauc. crit. III, 4 (1907) 118. — C. ruelli All., Fl. Pedemont. I (1785) 256. — Senebiera coronopus Poir., Encycl. meth. VII (1806) 76. — Ic.: Rchb., Ic. Fl. Germ., f. 4216.

Annual or biennial; stem 10–30 cm high, glabrous, prostrate, much branching; leaves glabrous, deeply pinnatifid, lobes oblong-lanceolate, entire or incised. Racemes short-capitate, opposite-leaved; pedicels shorter than flowers, thick; petals white, 2 mm long; silicles 2–2.5 mm long, 3 mm broad, reniform, broader across, netted-rugose, dentate around, with conical style. April–May.

Sands, mainly marine, gravels, roadsides, fields. — European part: M. Dnp., Bl., Crim.: Caucasus: Dag., W., S., and E. Transc. **Gen. distr.:** Atl. and Centr. Eur., Med., Bal.-As. Min. Introduced into N. Am., S. Afr. and Australia. Described from Europe. Type in Paris.

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* From the Greek korone – crown, and pus – foot. So named for the spreading and radially branching stem.

** Treatment by N.A. Bush.

Note. The distribution of this Mediterranean species in the Caucasus is in western and eastern Transcaucasia; it is absent in the middle part of the isthmus. Generally, such distribution is typical of many Mediterranean species; I noted this long ago in many parts of the work on Rhoeadales, in Fl. cauc. critic. The extinction of these lowland species is presumably due to the uplift of the middle part of the Caucasus.

Economic importance. The leaves are eaten as salad; the roots are eaten cooked.

2. **C. didymus** (L.) Sm., Fl. Brit. II (1804) 691; Shmal'g., Fl. Sr. i Yuzhn. Rossii, I (1895) 151; Grossg., Fl. Kavk II (1930) 151.— Lepidium didymum L. Mant., (1767) 92.

Annual or biennial, resembling the preceding species but stem slightly pubescent; pedicels longer than flowers and petals, thin. Fruiting racemes oblong-oval; flowers minute; petals yellowish, shorter than sepals; silicle oblate [transversely oval], 1.5 mm long, 2.5 mm broad, emarginate at base and apex, netted-rugose, without style.

Sands.— Caucasus: Batumi (introduced). **Gen. distr.:** Scand., Atl. and Centr. Eur., Dobruja, Riga, Med. Introduced into N. Am. and Australia. Described from Europe. Type in London.

Genus 666. **STUBENDORFFIA** * SCHRENK**

Schrenk in Ind.sem.HP IX (1844) Suppl.20; in Linnaea XVIII (1844) 218; Hayek, Crucif.-Syst. (1911) 289.

Sepals erect, not saccate. Filaments simple, edenticulate, free. Petals white, short-clawed. Silicle dorsally compressed, orbicular-obcordate,
539 broadly obcordate (broader across), spherical or obovate or obcuneate, winged or wingless, netted-veined, cells 1-seeded, sometimes one of the cells seedless; cotyledons long, transversely folded, embryo notorrhizal. Hairs simple or absent.— Perennials or biennials, with amplexicaul leaves and pendulous fruit.

Three of the four species of this Central Asian-Eastern Turkish genus are represented in the Soviet Union; the fourth — Turkish — is reported in case it is found in the USSR.

1. Silicle winged . . . . 2.
+ Silicle wingless. Inflorescence covered with minute hairs . . . . . . 3.
2. Completely glabrous plant, silicle obovate or obcordate, glabrous, longer than broad . . . . 1. **S. orientalis** Schrenk.
+ Leaves whitish-hairy beneath, carpel white-tomentose. Silicle broadly obcordate, nearly twice as broad as long . . . . ★**S. subdidyma** N. Busch.
3. Leaf with veins pinnate and much-branched, silicle slightly inflated, orbicular-obcordate or oblong-obcordate or obcuneate . . . . 2. **S. aptera** Lipsky.
+ Leaf veins arcuate, silicle spherical, broader than long, constricted along septum . . . . 3. **S. lipskyi** N. Busch.

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* After Shtubendorf, investigator of Siberian flora.

** Treatment by N.A. Bush.

Section 1. **ALATAE** N. Busch sect. nova. — Silicula alata. — Silicle winged.

1. **S. orientalis** Schrenk in Fisch. et Mey., Diagn. pl. nov. in Bull. phys.-math. Ac. Sc. Pétersb. III (1845) 309; Lipsky in A. H. P. XVIII, I (1900) 18. — Ic.: Schulz in Engl. et Pr., Nat. Pflzf. 17b (1936) 415, fig. 239. — Exs.: HFR No. 2753.

Perennial, glabrous plant; rootstock stout, covered above with decayed leaves; stem tall, up to 1.5 m, divaricately branching from middle; radical leaves very large, ovate-oblong to oblong-obovate, obtuse, long-petioled, reminiscent of the leaves of horse radish; cauline leaves subcordate at base, sessile, semiamplexicaul, tapering at apex, upper leaves small, all leaves netted-veined beneath, entire or slightly wavy or dentate. Panicle large; sepals glabrous, ca. 3 mm long, ca. 2—2.5 mm broad, broadly ovate, obtuse, reddish, broadly white-hyaline at margin especially above; petals
40 white, obovate, abruptly tapering into a narrow claw, ca. 7 mm long, up to 4 mm broad; pedicels filiform, 9—15 mm long in fruit; silicle not inflated or very slightly so, winged, orbicular-oval or rotund-obovate or broader than long, 17—25 mm long, 12—28 mm broad, shallowly notched at apex, style null, stigma sessile; seeds large, pendulous, dark brown. Fl. May—June, Fr. June—July.

Steppes, sunny slopes. — Centr. Asia: Balkh., Amu D., Syr D., T. Sh., Pam.-Al. Endemic. Described from the Khantau Mountains and the steppe near the Daba-Gainar stream. Type in Leningrad.

Note. The rootstock, up to 4 cm thick, is very long, sometimes multicipital; radical leaves up to 70 cm long with petiole, up to 17.5 cm broad; sepals 3—3.5 mm long, 2—2.5 mm broad, sometimes slightly pilose; petals 6—7 mm long, 3—4 mm broad.

★ S. **subdidyma** N. Busch in Journ. Bot. de l'URSS, Vol. 20, No. 1 (1935) 86.

Biennial; stem ca. 30 cm high, much branching in upper part, glabrous, sparsely simple-hairy only in lower part; rosetted leaves ovate-oblong, petioled, sparingly scabrous on both sides with long, whitish hairs, amplexicaul, long-auricled, acute. Inflorescence very large, many-branched; pedicels thin, gradually thickening toward apex, recurved below in fruit, 8—10 mm long, scantily pilose, hairs long, whitish; silicles 7—15 mm long, 15—20 mm broad, appearing geminate, broadly obcordate, nearly twice as broad as long, broadly-winged, with a very broad notch, outer lobes of wings rounded above, carpels white-tomentose, wings densely short-pubescent, valves carinate. April—May.

Dry hills. — **Gen. distr.:** Turkey, Kagyzman District. Described from Kagyzman District in the valley of the Araks River. Type in Leningrad.

Section 2. **APTERAE** Lipsky in A. H. P. XVIII, I (1900) 17. — Silicle wingless.

2. S. **aptera** Lipsky in A. H. P. XVIII, I (1900) 17; XXIII (1904) 29. — Ic.: Lipsky in A. H. P. XVIII, I, tab. II.

Perennial, glabrous plant, covered with minute hairs only near inflorescence, pale green; stem divaricately branching from middle or

only at summit, 30—45 cm high; radical leaves with shortly winged petioles, ovate or oblong-ovate, large, cauline leaves smaller, broad and slightly cordate at base, sessile, semiamplexicaul, tapering toward apex, upper leaves small, sometimes slightly wavy at margin, all leaves netted-veined at lower side, entire or rarely large-toothed. Inflorescence paniculate, rather large; sepals 2.5—3 mm long, oblong-obovate, reddish, narrowly white-
541 hyaline at margin; petals white, 5—6 mm long, rounded-obovate, narrowly clawed, as long as calyx; fruiting pedicels 8—15 mm long, thin, filiform, broadening somewhat at apex; silicles membranous, slightly inflated, compressed, orbicular-obcordate or oblong-obcordate or obcuneate, undulate at margin (var. isatidea Lipsky), yellowish or reddish, obscurely netted-veined; valves carinate, wingless, 15—23 mm long, 10—20 mm broad; seeds in each cell, dark brown, flat, narrowly marginate, rounded, 5—6 mm in diameter. May—June.

Stony slopes, 2,000 m or more. — Centr. Asia.: Pam.-Al. Endemic. Described from Gissar (valley of the Zarchob River, Sary-Socho Pass, Khovak). Type in Leningrad.

3. **S. lipskyi** N. Busch in Trav. Mus. Bot. Ac. Sc. St.-Pétersburg, X (1913) 125 cum icone; N. Busch in Rozhev. in Tr. pochv.-bot. eksp. Peresel. Upr. No. 12 (1912) 119 cum icone.

Perennial; stem 20—40 cm high, densely covered at base with grayish brown fibers of decayed leaves, branching from the middle; branches ascending; stem and branches short-pubescent; leaves entire, radical leaves petioled, oblong-elliptic, with 5 arcuate netted veins, cauline leaves sessile, semiamplexicaul, ovate-oblong (lamina often constricted in the middle), uppermost leaves linear. Flowers small; sepals 2.75 mm long; petals white, 4.5—5 mm long; fruiting pedicels thin, 4—7 mm long; silicles inflated, spherical, broader than long, constricted along septum, pale, often purple-nerved, 17—25 mm long, 18—30 mm broad; seeds 1 in each cell, ca. 8 mm long, ca. 4.5 mm broad, smooth, on rather thick stalks. May—June.

Stony slopes. — Centr. Asia.: T. Sh. (Centr.). Endemic. Described from the mountains of Centr. Tien Shan, in the valley of the West Karakol River. Type in Leningrad.

Note. Readily distinguished from S. aptera by shape of silicles and venation of leaves (in S. aptera leaf veins are not arcuate but pinnate-multipartite).

Genus 667. **MEGACARPAEA** * DC.**

DC., Syst. II (1821) 417.

Sepals not saccate at base. Petals entire; stamens 6 (in USSR species) or more [?], filaments edenticulate. Lateral nectariferous glands semi-annular, connate to the broad median glands. Fruit a silicle, flat-compressed perpendicularly to septum, segments [valves] broadly winged at margins; style undeveloped or short, not longer than half the length of ovary. Stigma

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* From the Greek megas — large, and karpos — fruit.

** Treatment by B.A. Fedchenko.

542 disciform, slightly 2-lobed. Seeds 1 in each cell, globular, flat-compressed. Embryo pleurorhizal, radicle ascending.— Perennial herbs, usually with thickened root and erect stem profusely branching at apex. Leaves usually palmately or pinnately divided. Inflorescence apical, paniculate, often many-branched. Flowers sometimes heterogamous.

Seven species in Central Asia, Mongolia, the Himalayas, and Yunnan. Four species in the USSR.

1. Silicle segments [valves] suborbicular and divergent . . . . 2.
+ Silicle segments [valves] elongate toward apex, acuminate, fusing at an acute angle . . . . 3.
2. Silicle valves not more than 10 mm across. Leaves divided . . . . 2. **M. megalocarpa** (Fisch.) Schischk.
+ Silicle valves 25—30 mm across. Leaves of sterile shoots peltate . . . . 1. **M. orbiculata** B. Fedtsch.
3. Tall plant (up to 2 m), with large fruit, silicle valves 20—30 mm long . . . . 5. **M. gigantea** Rgl.
+ Smaller plant (not more than 1 m), with smaller fruit; silicle valves not more than 15 mm long . . . . 4.
4. Leaves pinnatifid or pinnatilobate, lobes obtusely toothed. Flowers larger . . . . 3. **M. gracilis** Lipsky.
+ Leaves pinnatipartite, lobes pinnatifid, acutely toothed. Flowers smaller but more numerous . . . . 4. **M. schugnanica** B. Fedtsch.

Section 1. **ORBICULATAE** B. Fedtsch in Izvest. Akad. Nauk, VI series (1915) No. 10, p. 981.— Silicle segments [valves] suborbicular and divergent.

1. **M. orbiculata** B. Fedtsch in Izvest. Akad. Nauk VI series No. 10 (1915) 291.— Ic.: Ibid., p. 980 (sub M. gigantea).

Perennial, 50—100 cm high; root fusiform, long, thickened; stem solitary, erect, glabrescent, strongly branching above; leaves long-petioled, blade peltate, generally suborbicular, slightly 5—7-angled, sparsely and obtusely denticulate and obscurely lobed; 5—7 ribs diverging from apex of petioles; leaves of floriferous shoots oblong, amplexicaul, sinuate-dentate. Inflorescence paniculate, strongly branching, many-flowered, few-hairy; sepals oblong; petals oblong-ovate, slightly longer than sepals, white;
543 filaments cylindrical; ovary sessile, truncate at base, suborbicularly 2-lobed; style very short; silicle lobes [valves] suborbicular in mature fruit, 25—30 mm in diameter, elevated in the center, nerveless, surrounded by a thin, narrow, membranous, many-nerved wing. April—May.

Stony mountain slopes.— Central Asia: T. Sh. (southwestern spurs). Endemic. Described from the Mogol Tau Mountains and other places in western Tien Shan. Type in Leningrad.

2. **M. megalocarpa** (Fisch.) Schischk. in Kryl., Fl. Zap. Sib. V (1931) 1270 (synonymy).— Biscutella didyma Pall., Reise II (1773) 239; III, 521, 524, 545.— B. megalocarpa Fisch. ex DC., Monogr. des Biscutellées (1811) 5.— B. laciniata Willd. ex DC., Syst. II (1821) 417.— Megacarpaea laciniata DC., Syst. II (1821) 417; Ldb., Fl. Ross. I, 167.— M. angulata DC., Syst. II (1821) 418.— Ic.: DC., Monogr. Biscutel. tab. III; Ldb., Ic. Fl. Ross. IV, 372.

Perennial, 20–40 cm; root fusiform, tuberiform, thick (up to 3 cm), passing to a short rhizome densely covered at summit with rigid, decayed petioles; stem solitary, erect, glabrescent, divaricately branching above; radical leaves petioled, cauline leaves sessile, blades generally oblong-elliptic, up to 15–16 cm long, up to 10 cm wide, densely white-hairy, deeply pinnatisect into several irregularly laciniate lobes. Inflorescence paniculate, with pilose branches; flowers racemose, unequal; the lower 2–5 on a branch, without perianth and stamens, with only 1 ovary, together with a few flowers with calyx, whitish corolla, stamens and sterile ovary; the upper flowers with calyx, violet-pinkish corolla, stamens, and an undeveloped ovary; sepals greenish, linear, distinctly dilated toward apex, whitish along margin; petals linear; ovary reniform, cuneately tapering toward base, borne on a very short stipe; fruit developed only from the lower flowers (on branches), geminate, triangular-notched at both ends, silicles 2-locular, 22–32 mm broad, 18 mm long, carpels 1-seeded, seeds flat-compressed, rounded. April–May.

Deserts, dry clayey-solonetzic steppes, sometimes on rocks and stony slopes. — European part: L. V.; W. Siberia: U. Tob., Irt.; Centr. Asia: Ar.-Casp., Balkh. **Gen. distr.:** Mong. Described from the Inder Mountains. Type in Leningrad.

Note. The thick roots of this species are of nutritive value, notably the starch, and for this reason the local population regard it as an edible plant; it is highly deserving of cultivation.

544 The heterogamy of the flowers in the inflorescences is based on the data of Krylov (Flora Zap. Sib. VI, 1270).

Section 2. **OBLONGATAE** B. Fedtsch in Izv. Akad. Nauk VI, ser. (1915) No. 10, 983. — Silicle lobes [valves] oblong, tapering toward apex, connate at an acute angle.

3. **M. gracilis** Lipsky in A. H. P. XVIII (1900) 13. — Ic.: A. H. P. XXIII, tab. 18.

Perennial, 25–60 cm high; roots thick, densely covered at summit with blackish brown fibers of decayed leaves; stem low at flowering, growing markedly in fruit; lower leaves with winged petioles and ovate blade; leaves of sterile shoots with thin, nearly wingless petioles; lamina deeply pinnatisect, notches reaching almost the median nerve, lobes oblong, obliquely truncate above, denticulate; cauline leaves oblong, sessile, semiamplexicaul, 2-auricled, large-toothed, the terminal subentire, linear. Inflorescence at first rather dense, corymbose, branches elongate later to form loose racemes; sepals broadly oblong, rounded at apex, slightly shorter than petals; petals yellow, with claw one-fifth as long as the oblong-elliptic blade; ovary rounded at base, filaments flat-broadened; silicles broad, 2-lobed, united by the short septum; silicle lobes [valves] long-oblong or obovate, 20–30 mm long, with an acutely angled notch between them, bright and elevated in center, surrounded by a flat, rather broad, grayish violet wing; seeds flat. July.

Mountain slopes, glacial moraines, high-mountain zone. — Centr. Asia: Pam.-Al. Endemic. Described from Darvaz and Karategin. Type in Leningrad.

4. **M. schugnanica** B. Fedtsch. in Izvest. Akad. Nauk., VI ser. (1915) No. 10, p. 985.

Perennial, 50—100 cm high; rootstock 20—50 cm long, up to 2.5 cm thick, covered at summit with decayed petioles of old leaves; stems thick, erect, glabrous, branching at summit; radical leaves with 20—30 cm long petioles, blade up to 50 cm long, pinnatipartite, lobes up to 35 cm, pinnatifid, lobules pinnatilobulate, sharp-toothed; cauline leaves gradually smaller and less dissected, upper leaves linear-oblong, strongly serrate. Inflorescence paniculate, branching, lower branches secondary; flowers on long pedicels, numerous; sepals oblong-ovate; petals yellow, oblong; filaments flat-broadened; ovary on stipe, subcuneately tapering toward base, broader than
545 long, notched at apex; style short, not protruding from notch; silicle lobes [valves] oblong, tapering at apex, 10—14 mm long, 6—8 mm broad, diverging from each other at an acute angle, elevated and whitish in center, surrounded by a broad brownish purple wing. June.

Rocks and rock streams. — Centr. Asia: Pam.-Al. (Shugnan). Endemic. Described from the Abkharvo Valley in Shugnan. Type in Leningrad.

5. **M. gigantea** Rgl., Suppl. II ad Enumer. pl. a Semen. lect. No. 90a in Bull. Soc. Nat. Mosc. (1870) 263. — Ic.: B. Fedch. in Izv. Akad. Nauk VI, ser. (1915) No. 10, p. 984, r. 2—3.

Perennial, 100—200 cm high; rootstock up to 40—50 cm long, thickened, up to 7—8 cm thick, simple or few-branched; stem solitary, erect, glabrous, thick, at base ca. 3—4 cm in diameter, branching toward summit; radical leaves glabrescent, petioled, large, cordate-rounded in outline, blade up to 40 cm long, palmately divided, lobes sessile or petioled, pinnatilobate and dentate; cauline leaves gradually reduced, the lower short-petioled or sessile, ovate-oblong, pinnatifid, the upper oblong, pinnatilobate. Inflorescence paniculate, strongly branching, branches glabrous, pedicels pilose; calyx slightly hairy outside, sepals oblong, greenish white, with several longitudinal veins; petals white, hardly longer than sepals, with a conspicuous laterally branched midrib, slightly dilated toward apex, nearly obovate; ovary reniform, emarginate at apex, slightly cuneately tapering at base; style half as long as ovary; stigma large; silicle lobes [valves] oblong, slightly elongating toward apex, 38—41 mm long, 28—30 mm broad, diverging in an acute angle from each other, broadly winged.

Grassy, not stony mountain slopes. — Centr. Asia: T. Sh. (western spurs), Pam.-Al. Endemic. Described from the Kkharly-Tau and Sulyukta Mountains south of Leninabad (Khodzhent). Type in Leningrad.

Note. The thick roots of this plant contain enormous quantities of nutritive substances, starch in particular, which is why the plant is regarded as edible by the people of mountainous Tadzhikistan. The cooked roots are delicious.

Genus 668. **WINKLERA** * RGL.**

Rgl. in A.H.P. IX (1886) 617; Hayek, Crucif.-Syst. (1911) 291.

Sepals erect, not saccate; petals yellow, immarginate, short-clawed; filaments free, edenticulate. A triangular nectariferous gland at both sides

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* After K. Vinkler, botanist at the St. Petersburg Botanical Garden.

** Treatment by N.A. Bush.

546 of each of the shorter stamens and in front of each pair of the longer stamens. Ovary sessile; style rather long; stigma capitate, slightly 2-lobed. Fruit indehiscent, slightly bilaterally compressed, elliptic or oblate or suborbicular or rhombic, often oblique, slightly netted-veined, valves helmet-shaped, wingless; cells 1-seeded, often one of the cells seedless; embryo pleurorhizal. Hairs simple or absent. — Perennials, with branching inflorescence and pinnate leaves.

A Central Asian genus, 2 species.

1. Leaves pinnate, silicles convex, smooth . . . . . . 1. **W. patrinioides** Rgl.
+ Leaves bipinnate, silicles compressed, rugose . . . . 2. **W. silaifolia** (Hook. et Thoms.) Korsh.

1. **W. patrinioides** Rgl. in A. H. P. IX, 2 (1886) 618. — Ic.: Schulz in Engl.-Pr., Nat. Pflzf. 17b (1936) 414, fig. 238.

Perennial, covered with minute setulae barely visible even under strong magnification; rootstock stout, multicipital, covered at summit with decayed leaves; stems several, 10—40 cm high; leaves pinnatisect, radical leaves 8—20 cm long, 4—6.5 cm broad, terminal segment large, ovate, incised into a small number of large teeth or lobes, lateral segments, 3—9-pairs nearly opposite, obovate or lanceolate, decurrent, entire or irregularly dentate, all petioled, radical leaves with longer petioles, the uppermost long, subsessile. Raceme strongly branching (inflorescence paniculate); pedicels and sepals pilose; sepals oblong, narrowly white-hyaline at margin, obtuse, erect, 2.5—3.5 mm long; petals yellow, 5—6 mm long, blade rounded, abruptly tapering into a very long, narrow claw; fruiting pedicels thin, 5—15 mm long; silicles convex, broad-oval or broad-elliptic, tapering at both ends; septum broad; seeds large, brown, oblong, rimless, filling the entire cell; cotyledons transversely folded; style 0.75—1.5 mm long, gradually tapering toward apex. April—June.

Grassless slopes and passes, ca. 2,800—3,000 m, sometimes descending to 1,400 m. — Centr. Asia: Amu D., Pam.-Al. Endemic. Described from eastern Bukhara, from the Chorabdarre stream, a tributary of the Kizyl-Su River from Kulyab near Mumynavad, and from the Kukh-i-Fur Mountains, 1,400 m, and also from the Darvaz Mountains near Khazret-Sultan village. Type in Leningrad.

2. **W. silaifolia** Korsh. in Bull. Acad. Pétersb. Sér. V, T. IX, No. 5 (1898) 419; Lipsk. in A. H. P. XVIII (1900) 220.

Perennial, completely glabrous or villous along stems, leaves, pedicels and calyx; rootstock thick, multicipital, covered at summit with decayed
547 fibrous leaves; nearly all leaves radical, bipinnatipartite; first segments 5—10-pairs, nearly all not opposite, pinnatipartite up to midrib; lobules 2—3-pairs, remote, entire, linear, or oblong-linear, or 2—3-fid; stems slightly cylindrical, almost leafless, many-branched above, 10—50 cm high. Inflorescence corymbose at first, later becoming loose, paniculate; sepals broadly ovate, sometimes convex, ca. 2.5 mm long, white-hyaline at margin; petals yellow, 4—5 mm long, with rounded blade and claw as long as sepals; fruiting pedicels thin, 7—14 mm long; silicles flattened, rounded or transversely broad-elliptic, rounded or subcordate at base, 7—11 mm long,

8–13 mm broad, valves crisp-tubercled; style thin, 1.5 mm long; stigma capitate; seeds dark brown, 3.5 mm long, 2 mm broad, finely punctate under strong magnification, rimless, flattened. Júne–July.

Stony slopes, taluses, and stony mountain tops, 2,000–4,000 m. — Centr. Asia: Pam.-Al. (Pamirs, Shugnan, Roshan, Darvaz). Endemic. Described from Darvaz. Type in Leningrad.

Genus 669. **HEDINIA** * OSTENF.**

Ostenf.in Sven Hadin, Southern Tibet VI (1922) 76.

Sepals erect, not saccate. Petals clawed, white, obtuse, not notched. Filaments simple, free. Oval-orbicular nectariferous glands at base of shorter stamens, median glands absent. Silicles broad-elliptic, truncate, bilaterally flattened and accordingly septum narrow, valves carinate, style short, thick; seeds many, embryo notorrhizal. — Gray-pubescent with soft, white, simple and branched hairs, all or at least the lower flowers with pinnatipartite bracts.

A monotypic genus common to Tibet, Mongolia, the Himalayas, and the Soviet part of Central Asia.

1. **H. tibetica** (Thoms.) Ostenf. in Sven Hedin, Southern Tibet VI (1922) 77. — Hutchinsia tibetica Thoms. in Hook., Ic. pl. tab. 900 (1852). — Smelovskia tibetica Lipsky in A . H. P. XXIII (1904) 76. — Capsella thomsoni Hook. f. in Journ. Linn. Soc. V (1861) 172. — Ic.: Ostenf., l. c., tab. I, f. 2.

Perennial; root long, fusiform; stems numerous, prostrate on the ground, ascending only at summit, 5–25 cm long; all leaves pinnatipartite, segments 548 4–5 pairs, pinnatifid, ovate-lanceolate, the terminal usually ovate. Racemes long, more loose in fruit; flowering pedicels 1–1.5 mm long, fruiting pedicels 3–6 mm long; flowers small; sepals pilose, oblong-elliptic, white-margined, 1.5–2.5 mm long; petals white, blade obovate or orbicular-obovate, claw narrow, as long as petals [sic], 2.5–3.5 mm; silicles glabrous, 7–10 mm long, 3–4 mm broad; seeds pitted-sulcate, brown, ca. 1 mm long, ca. 0.6 mm broad. June.

Pebbly-sandy and stony slopes, rocky riverbanks, saline takyrs [clay soil areas in Central Asian deserts and semideserts], 4,500–5,500 m. — Centr. Asia: Dzu.-Tarb., T. Sh., Pam.-Al. **Gen. distr.:** Tib., Kash., and Him. Described from western Tibet (Ladakh, Nubra). Type in London.

Genus 670. **HUTCHINSIA** † R. BR.**

R.Br.in Ait.Hort.Kew.ed.2, IV (1812) 82.

Sepals equal. Petals white. Filaments free, edenticulate. A triangular nectariferous gland at both sides of shorter stamens. Silicles broad-ellipti obtuse, bilaterally compressed; valves carinate, wingless; septum narrow, membranous. Stigma sessile, emarginate. Cells 2-seeded. Embryo pleurorhizal, cotyledons flat. Low annuals, shortly pubescent.

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* After the Swedish traveler Swen Hedin.

** Treatment by N.A. Bush.

† After Hutchins, Irish botanist, who studied this plant in the Swiss Alps.

A Mediterranean oligotypic genus.

1. **H. petraea** (L.) R. Br. in Ait., Hort. Kew. ed. 2, IV (1812) 82; Ldb., Fl. Ross. I, 200; Shmal'g., Fl. I, 94; N. Busch in Fl. cauc. crit. III, 4 (1909), 376.— Lepidium petraeum L., Sp. (1753) 644.— Hornungia petraea Reichb., Deutschl. Fl. I (1837) 33; Schulz (1936) 459.— Ic.: Smith, Engl. Bot. tab. III; Rchb., Ic. Fl. Germ., tab. VI, fig. 4190; Schulz, l. c., fig. 275, A-D.— Exs.: Fl. exs. Austro-Hung. No. 2514.

Annual, small plant, 3—13 cm high, very short-pubescent; radical leaves rosetted, all pinnatisect, segments elliptic or oblong, equal. Raceme 7—50-flowered; flowers minute; sepals 0.75 mm long; fruiting pedicels 4—7 mm long; silicles elliptic, obtuse, 2.5—3.5 mm long, 1.25—2 mm broad; seeds brown-rufous, 0.75—1.25 mm long, 0.5—0.75 mm broad. March—May.

Rocks, limestones, sands, stony places.— European part: Bl., Crim. **Gen. distr.:** nearly all Europe, Mediterranean. Described from Europe. Type in London.

549 Genus 671. HYMENOLOBUS * NUTT.**

Nutt. ex Torr. et Gray, Fl. of N. Am. I (1838) 117.— Hinterhubera Rchb., ex Nym. Consp. III (1878) 66, non Schulz Bip.; Prantl in E.-Pr. Nat. Pflzf. III, 2 (1891) 188 (sect. Hutchinsiae); Polyspermum N. Busch in Fl. cauc. crit. III, 4 (1909) 373 (sect. Hutchinsiae).

Sepals equal, divergent. Petals white. Filaments free, edenticulate. Ovary sessile. Style short, with capitate, slightly 2-lobed stigma. Silicles broad-elliptic or rotund, laterally compressed, valves carinate, cells many-seeded. Embryo notorrhizal. Small annuals, with entire or pinnatisect leaves.

Oligotypic genus, in element, of Near and Central Asia.

1. Completely glabrous plant, silicles broad-elliptic. In plains . . . . 1. **H. procumbens** (L.) Nutt.
+ Short-pubescent plant, silicles rotund. In high mountains . . . . 2. **H. puberulus** (Rupr.) N. Busch.

1. **H. procumbens** (L.) Nutt. ex Torr. et Gray, Fl. N. Am. I (1838) 117; Voron., Fl. Yugo-Vost. ed. V (1931) 418.— Lepidium procumbens L., Sp. pl. (1753) 643.— Capsella elliptica C. A. M., Verz. (1831) 194; Ldb., Fl. Ross. I (1842) 199, 764.— C. procumbens Fries, Novit. Suec. I, 14; Boiss., Fl. Or. I (1867) 340; Shmal'g,, Fl. I (1895) 97.— Hutchinsia procumbens Desv., Journ. Bot. III (1814) 168; N. Busch in Fl. cauc. crit. III, 4 (1909) 373.— Ic.: Rchb., Ic. Fl. Germ. f. 4221 (sub Capsella procumbente); Voron., l. c., 419.— Exs.: HFR No. 1007 (sub Capsella procumbente).

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* From the Greek hymen — membrane and lobos — lobe.

** Treatment by N.A. Bush.

Annual, usually small plant, 2.5–27 cm high; leaves usually pinnatipartite, lobes elliptic or lanceolate, the upper leaves often entire, oblong, rarely all entire (var. integrifolia N. Busch). Flowers minute; sepals ca. 0.75 mm long; petals 1 mm long; fruiting raceme 2–20 cm long, pedicels 5–12 mm long; silicles broad-elliptic, 3–4 mm long, 1.75–2.25 mm broad; seeds brown, 0.75 mm long, 0.3 mm broad. April–May.

Clayey and sandy solonetzes.— European part: Bl., L. Don, L. V., Crim.; Caucasus: Cisc., W., E., and S. Transc., Tal.; W. Siberia: Irt., Alt.; Centr. Asia: Ar.-Casp., Balkh., Kara K., Kyz. K., Syr D., T. Sh., Pam.-Al. **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran., Tib., Mong., N. Afr., introduced into Chile and Australia. Described from Europe. Type in London.

550 2. **H. puberulus** (Rupr.) N. Busch comb. nova.— Hutchinsia puberula N. Busch in Fl. cauc. crit. III, 4 (1909) 375.— Capsella puberula Rupr., Fl. Cauc. (1869) 129; Boiss., Fl. Or. Suppl. (1888) 49.

Annual, small plant, 2.5–6.5 cm high, puberulent-scabrous, mainly near inflorescence with furcate and simple hairs; leaves subentire, ovate or oblong, tapering into a petiole, lower leaves 5–18 mm long, 4–10 mm broad, petioles 8–40 mm long. Racemes loose, 3–14-flowered; sepals 1 mm long; petals 1.1 mm long; fruiting pedicels divaricate, filiform, 4–7 mm long; silicles rotund, obtuse, 3–3.5 mm long, 2.5–3 mm broad, valves nerved, stigma sessile. June.

Taluses, limestone caves, weedy places in the high-mountain zone, 1,700–2,800 m.— Caucasus: Alps of the Greater Caucasus. Endemic. Described from Dagestan, Talakori plateau between Khunzakh and Karata. Type in Leningrad.

Note. According to Akinfiev, the live plant smells like garden cress (Lepidium sativum L.).

Genus 672. **IBERIS*** L.**

L., Sp.pl. (1753) 648; Gen.pl. (1754) 292; Hayek, Crucif.-Syst. (1911) 292.

Sepals divergent, not saccate. Petals white, pink, or lilac, the two outer much larger than the inner (corolla zygomorphous). Filaments simple, free. A triangular nectariferous gland at both sides of shorter stamens. Fruit ovate or orbicular, 2-valved, laterally flattened, more or less emarginate at apex, with narrow septum. Valves keeled, often with a coriaceous wing at apex or around. Ovules one in each carpel, pendulous. Cotyledons flat, embryo pleurorhizal. Hairs simple. Herbs or undershrubs, with flowers in umbellate racemes.

A genus of 30 species, common to southern and Central Europe; 4 species are encountered in the USSR, one of which was unquestionably introduced.

1. Leaves pinnate or large-toothed . . . . 2.
+ Leaves entire . . . . 3.
2. Leaves oblong-linear, pinnate, long-lobed . . . . 3. **I. pinnata** L.

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* From Iberia – now Georgia (SSR), and also from Spain.

** Treatment by N.A. Bush.

+ Leaves oblong-cuneate, obtuse, few- and large-toothed . . . . **4. I. amara L.**
3. Low-branching shrub, with coriaceous sublinear leaves . . . . **1. I. saxatilis L.**
+ Biennial, with oblong-spatulate leaves . . . . **2. I. taurica DC.**

551 1. **I. saxatilis** L., Cent. pl. II (1756) 23; Amoen. Acad. IV (1759) 321; Sp. pl. 905; Ldb., Fl. Ross. I, 166; Shmal'g., Fl. I, 96; N. Busch in Fl. cauc. crit. III, 4 (1907) 122. — Ic.: Rchb., Ic. Fl. Germ. II, tab. VIII, f. 4200.

Shrub, branching, 7–15 cm high; branches simple, crowded, short, short-pubescent, densely leafy; leaves coriaceous-fleshy, subcylindrical, sublinear, spatulate at apex, acuminate, tapering at base, ciliate. Racemes short; petals white or flesh-colored, 5–8 mm long; silicles in umbels, oval or orbicular, 6.5–9 mm long, 7–7.5 mm broad, acutely emarginate (angle of notch acute) with rounded lobes; style not exceeding notch; replum concave outside; seeds 3.5 mm long, 2.5 mm broad. March–May.

Rocks. — European part: Crim. (Yaila and southern shore). **Gen. distr.:** Med. (European part), Rumania. Described from Europe. Type in London.

2. **I. taurica** DC., Syst. II (1821) 402; Ldb., Fl. Ross. I (1842) 165; Shmal'g., Fl. I, 96; N. Busch in Fl. cauc. crit. III, 4 (1907) 123. — I. ciliata Willd., Sp. pl. III (1800) 455; M. B., Fl. taur.-cauc. II, 102 (non All.). — Exs.: Fl. Cauc. exs. (1906) No. 89.

Biennial, branching from the very base, all branches rough with small white setulae, 8–25 cm high; lower leaves spatulate or spatulate-obovate, cauline leaves linear-spatulate, entire or sparingly toothed at apex, ciliate at margin. Racemes very short; petals 6–8 mm long, white, pink, or flesh-colored; silicles oval or orbicular-oval, ca. 9 mm long, ca. 7 mm broad, notch narrow, acute, with lateral lobes acute or obtuse; style exceeding notch; seeds ca. 3.5 mm long, ca. 2.5 mm broad. May–June.

Stony places, dry calcareous slopes and hills, up to 2,000 m. — European part: L. Don (Taganrog), Crim. (foothills, Yaila, and southern shore); Caucasus: Cisc. (Karachai, laccolites in the Pyatigorsk area), W. Transc. (northwest part). **Gen. distr.:** As. Min., Syria, Arm.-Kurd. Described from the Crimea. Type in Geneva.

3. **I. pinnata** L., Amoen. Acad. IV (1759) 278; N. Busch in Fl. cauc. crit. III, 4 (1907) 125. — Ic.: Rchb., Ic. Fl. Germ. II, tab. VII, f. 4195. — Exs.: Rchb., Fl. Germ. exs. No. 1958.

Annual; stem simple or branching from base, 12–28 cm high; leaves oblong-linear, pinnatifid or pinnatipartite, lobes linear, obtuse. Flowers white or reddish; racemes short, even in fruit, often umbellate, dense or loose; silicles oval or orbicular, 5–6 mm long, ca. 5 mm broad, broad-emarginate, lateral lobes divergent, acute; style longer than notch; seeds brown, flattened smooth. April.

552 Stony places. — European part: southern shore of the Crimea (Kikineiz). **Gen. distr.:** Atl. Eur., Centr. Eur., Eur. Med., As. Min. Described from Europe. Type in London.

Note. Typical Mediterranean genus.

4. **I. amara** L., Sp. pl. (1753) 649; Shmal'g., Fl. I (1895) 95; N. Busch in Fl. cauc. crit. III, 4 (1907) 126. — Ic.: Rchb., Ic. Fl. Germ. II, tab. VII, f. 4197. — Exs.: Rchb., Fl. Germ. exs. No. 2462.

Annual, glabrous or sparingly pubescent; stem branching, 15—40 cm high; leaves oblong-cuneate, obtuse, with few large teeth mainly at apex. Petals white or slightly violet, 4—8 mm long; fruiting pedicels divergent; silicles suborbicular, 5—7 mm long and broad, broadly emarginate, with divergent acute triangular lobes (wings), wing not as broad as silicle; style exceeding notch. June—July.

Weed-infested places, very rare. — European part: M. Dnp., V.-Don, Bl., L. Don, Crim.; Caucasus: E. Transc. (Tbilisi). **Gen. distr.:** Atl. and Centr. Eur., Italy, Rumania. Grows wild in Algeria, Turkey, New Zealand, and other countries. Described from Europe. Type in London.

Note. This Central European plant has been introduced into a few places in the Soviet Union.

Genus 673. **AETHIONEMA** * R. BR.**

R.Br. in Ait. Hort. Kew. (1812) 80.

Sepals divergent, equal. Petals white, pink, pinkish lilac, or yellow. Longer filaments winged inside and dentate close to apex, rarely all filaments wingless and edentate. Lateral filaments always entire. A small nectariferous gland on both sides of shorter stamens. Ovary sessile. Style distinct, stigma small. Silicles two-valved, laterally compressed, polymorphic, from cordate or orbicular to oblong-linear depending upon the presence (or absence) and shape of wings on valves. Some other fruit on an individual plant of the same shape but smaller in size, indehiscent, 1-seeded, aseptate. Cotyledons flat. Embryo notorrhizal in the many-seeded, dehiscent silicles, pleurorhizal in the 1-seeded, indehiscent silicles. Hairs simple or absent. — Herbs or undershrubs. Leaves small, entire, spirally arranged.

Around 60 species, mainly Near Asian and East Mediterranean. Some grow in the Pyrenees and the Alps.

53 1. Silicles wingless. Leaves prominently nerved beneath. Style as long as silicles or almost so, rarely one-third as long . . . . 2.
+ Silicles winged. Leaves nearly always prominently nerved. Style much shorter . . . . 5.
2\. Perennials, cespitose, stems small . . . . 3.
+ Undershrubs, much taller. Silicles oblong-linear. Leaves oblong, lanceolate, or ovate-oblong . . . . 4.
3\. Silicles oval. Lower leaves linear or linear-oblong, upper leaves oblong . . . . 21. **A. heterophyllum** Boiss.
+ Silicles elliptic. Leaves small, linear, rigid, membranous-serrate at margin, mucronate at tip . . . . 22. **A. caespitosum** Boiss.
4\. Leaves ca. 3-nerved, the upper obtusely subcordate-amplexicaul . . . . 19. **A. trinervium** (DC.) Boiss.

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* From the Greek aithos — burning heat and nema — thread.

** Treatment by N.A. Bush.

+ Leaves 5—7-nerved, cauline leaves deeply and acutely sagittate at base . . . . 20. **A. sagittatum** Boiss.

5. Silicle oblong-oval, with wings at apex only as long as breadth of cell, reduced downward, absent at base. Nerves prominent. Resembling preceding species in habits. Undershrubs. Style longer than notch of silicle . . . . 6.

+ Silicles oblong-elliptic or obcordate-orbicular. Wing equally developed, if broader at apex, then one-half to one-third as long as breadth of cell and not reduced downward . . . . 7.

6. Leaves alternate, various: lower leaves oblong-lanceolate, rounded or slightly tapering at base, upper leaves wider, oval-oblong, deeply cordate. Flowers yellow . . . . 18. **A. salmasium** Boiss.

+ Leaves triangular-cordate, lower leaves opposite. Flowers pink . . . . 17. **A. cardiophyllum** Boiss. et Heldr.

7. Undershrubs, with long rod-shaped stems and silicles oblong-elliptic, wings equally developed from base to apex, as broad as cell . . . . 8.

+ Annuals or undershrubs. Stems shorter, not rod-shaped. Silicles orbicular-obcordate, wings broad, longer than breadth of cell . . . . 20.

554 8. Stems simple or scarcely branching . . . . 9.

+ Stems strongly branching . . . . 15.

9 Silicles imbricate, forming a conelike fruiting raceme. Notch of silicle deep, wing entire. Flowers pink . . . . 10.

+ Silicles not so densely arranged, raceme not conelike 12.

10. Silicle notch closed. Filaments edenticulate . . . . 12. **A. schistosum** Boiss. et Ky.

+ Silicle notch broad . . . . 11.

11. Filaments of longer stamens denticulate below apex . . . . 13. **A. membranaceum** DC.

+ Filaments of all stamens edenticulate . . 14. **A. edentulum** N. Busch.

12. Stems thin, rod-shaped, long. Silicle notched at apex and base. Filaments of longer stamens dilated then tapering above base . . . . 4. **A. elongatum** Boiss.

+ Stems low . . . . 13.

13. Silicle notch narrow or closed, nearly half as long as silicle. Wings slightly sinuate or eroded-dentate . . . . 14.

+ Silicle notch broad, obtuse. Wings crenate . . 10. **A. armenum** Boiss.

14. Petals 9.5—10 mm long . . . . 7. **A. grandiflorum** Boiss.

+ Petals ca. 6 mm long . . . . 8. **A. pulchellum** Boiss. et Huet.

15. Plant spiny . . . . 16.

+ Plant not spiny . . . . 17.

16. Stem flexuous-geniculate . . . . . . 6. **A. spinosum** (Boiss.) N. Busch.

+ Stem straight . . . . 5. **A. transhyrcanum** (Czerniak.) N. Busch.

17. Stems thin, rod-shaped. Wings entire, equal, at each side as broad as or slightly narrower than cell . . . . 18.

+ Stems not rod-shaped. Wings not equal, eroded-dentate or undulate and obscurely dentate, on both sides broader than cell . . . . . . 20.

18. Leaves linear-spatulate. Wing with obscure notch at apex. Stigma sessile . . . . 1. **A. szovitsi** Boiss.

+ Leaves oblong-spatulate. Style small, prominent . . . . 19.

555 19. Wing abruptly truncate at apex, not emarginate. Flowers white . . . . 2. **A. lipskyi** N. Busch.

+ Wing emarginate at apex and base. Flowers pink . . . . 3. **A. voronovii** Schischk.

20. Stems low, corymbosely branching. Raceme dense even in fruit. Petals ca. 6 mm long . . . . 21.

+ Stems not corymbosely branching. Petals 4—5 mm long . . . . . . 22.

21. Fruiting raceme elongate. Wings undulate, obsoletely sinuate . . . . 9. **A. levandovskyi** N. Busch.

+ Fruiting raceme short. Wings radiately-plicate, deeply dentate or incised up to middle . . . . 11. **A. diastrophis** Bge.

22. Silicles imbricate in dense conelike raceme. Wings entire . . . . 15. **A. arabicum** (L.) Andrz.

+ Lower silicles often unilocular, one-half to one-third as long as the upper. Silicles arranged in dense raceme, but wings large sinuate-dentate, crestate . . . . 16. **A. carneum** (Sol.) Fedtsch.

Section 1. **ISOPTERA** N. Busch in A. H. Jurjev. VII, 4 (1907) 219.— Silicles elliptic, unilocular, 1-seeded, wings entire, equal, at both sides as broad as or slightly narrower than cell.

1. **A. szovitsi** Boiss., Fl. Or. I (1867) 345; N. Busch in Fl. cauc. crit. III, 4 (1907) 130.

Undershrub, many-stemmed, ca. 25—40 cm high; stems elongate, rod-shaped, profusely branching; leaves linear-spatulate, obtuse, 18—20 mm long. Racemes rather short; flowers medium-sized; petals pink, ca. 4 mm long; filaments of longer stamens dilated, edenticulate; silicles obscurely notched at base and apex, sometimes truncate and notchless at top, wings at both sides about as broad as cell. Stigma sessile. June. (Plate XXX, Figure 4).

Caucasus: S. Transc. (Karabakh, Nakhichevan ASSR). **Gen. distr.:** Iran. Described from N. Iran. Type in Geneva, cotype in Leningrad.

2. **A. lipskyi** N. Busch in Fl. cauc. crit. III, 4 (1907) 131.

Undershrub, many-stemmed; stems elongate, rod-shaped, thin, ca. 40 cm high, profusely branching; leaves oblong-spatulate, obtuse, 2.5—3 cm long, 4—6 mm broad, the uppermost 1.5—2 cm long, 2—3 mm broad. Silicles obovate-
556 oblong, truncate at apex, immarginate, tapering at base, immarginate at base, immature silicles 4—5.5 mm long, 2—3 mm broad, wing entire, nearly as broad at both sides as cell; style prominent, 0.25—0.3 mm long.

Caucasus: S. Transc. (Ordubad). Endemic. Described from Ordubad. Type in Leningrad.

3. **A. voronovii** Schischk. in schedis Herb. Fl. Cauc., fasc. X (1931).

Undershrub, completely glabrous, woody at base; stems many, rod-shaped, 35—40 cm high, leafy throughout, slightly branching at summit; leaves linear-elliptic, subobtuse, tapering at base, sessile. Flowering racemes dense, subcapitate, later elongating; pedicels hardly as long as calyx; sepals reddish, obtuse, 1.5 mm long, white-margined; petals pink, spatulate-orbicular, twice as long as calyx; filaments connate in pairs at base, more dilated on one side, the longer filaments abruptly tapering from the middle upward; silicles elliptic, with broad notch or obsoletely emarginate at base and apex, 7 mm long, 4.5 mm broad, unilocular, 1-seeded, wing entire; style short (0.4 mm). June.

Rocky slopes.— Caucasus: S. Transc. **Gen. distr.**: Turkey. Described from the Aras River in Turkey. Type in Leningrad.

Note. This species is distinguished from A. szovitsi and A. elongatum by the dimensions and shape of leaves, the leafiness of the whole stem, the shorter, subcapitate (not elongate or loose) inflorescence, and by the longer style. It is distinguished from A. lipskyi by its pink flowers (not white) and silicles emarginate at base and apex (not truncate).

4. **A. elongatum** Boiss. Diagn., Ser. I, No. 6 (1845) 17; Fl. Or. I (1867) 345; N. Busch in Fl. cauc. crit. III, 4 (1907) 131; in Acta Inst. Bot. Ac. Sc. Sér. I, fasc. III (1936) 360.— A. schelkovnikowi Bordz. in Bull. Jard. Bot. Kiew. XII-XIII (1931) 112.

Undershrub, many-stemmed; stems rod-shaped, thin, elongate, simple, 25—50 cm high; leaves elliptic-linear, subobtuse, 1—3 cm long. Flowers medium-sized; petals pink, 5—6 mm long; filaments of longer stamens dilated above middle, tapering, edenticulate; silicles notched at base and apex, ca. 8 mm long, 5.5—6.5 mm broad, with wing nearly as broad at both sides as cell; stigma subsessile in notch. Fr. July. (Plate XXX, Figure 3).

Caucasus: S. Transc. (Lake Sevan). **Gen. distr.**: Iran. Described from S. Iran. Type in Geneva, cotype in Leningrad.

557 Section 2. **MORIERA** (Boiss.) N. Busch.— Boiss., Ann. Sc. Nat. (1842) 182 (pro gen.).— Silicle unilocular (1 seed matures), winged. Spiny plants.

5. **A. transhyrcanum** (Czernjak.) N. Busch, comb. nova.— Moriera transhyrcana Czernjak. in Fedde, Repert. XXVII (1930) 270.

Undershrub, stems numerous, branching from base, ca. 30 cm high, older branches woody, rod-shaped, nearly leafless, spiny; young stems simple, thin, glabrous, leafy; leaves small, linear, slightly fleshy, glaucescent (like branches). Racemes short, corymbose; pedicels 2—3 mm long; sepals 2—2.5 mm long, linear, obtuse, reddish, white-hyaline at margin; petals ca. 6 mm long, 2 mm broad; filaments edenticulate, not dilated; silicle unilocular, cell 2-ovuled, 6—7 mm long, 5—6 mm broad, wings entire, uniformly broad, green or red-striate, narrowly and deeply notched at apex; stigma sessile; cell with 1 prominent nerve, otherwide smooth, obovate, ca. 2 mm broad; each wing ca. 1.5 mm broad; seed single, smooth. Embryo pleurorhizal. April. (Plate XXXI, Figure 3).

Gravelly slopes.— Centr. Asia: Mtn. Turkm. (Kopet Dagh). Endemic. Described from Kopet Dagh. Type in Leningrad.

6. **A. spinosum** (Boiss.) N. Busch, comb. nova.— Moriera spinosa Boiss., Fl. Or. I (1867) 338; Schulz (1936) 439.— M. gracilis Czernjak. in Fedde, Repert, sp. XXVII (1930) 269.— Ic.: Schulz, Nat. Pflz. 17b (1936) fig. 262.

Shrub, building hemispherical cushions ca. 70 cm across; stems and old branches woody, gray, many, strongly dichasially branched; branches thin, brittle, spiny; leaves minute, linear, fleshy, glaucescent, glabrous, easily deciduous. Pedicels very short, 0.75—1 mm long; sepals 1.5 mm long, obtuse, white-hyaline at margin; petals 3.5 mm long, 1.25 mm broad at apex, oblong-cuneate; filaments edenticulate, not dilated; silicles glabrous, oval-orbicular, 4 mm long, 3.5 mm broad; wings narrow, somewhat broader than the cell, equal, notch inconspicuous; stigma sessile; cell prominently nerved, otherwise smooth, wings 1.25 mm broad, the same width of cell; seeds 1 (ovules 4). May—June. (Plate XXX, Figure 6).

Gravels.— Centr. Asia: Mtn. Turkm. (Kopet Dagh). **Gen. distr.:** Iran. Described from Isfahan. Type in Geneva, cotype in Leningrad.

Section 3. **THLASPIDOPSIS** N. Busch in Acta H. Jurjev. VII, 4 (1907) 219.— Silicles usually obcordate, bilocular, cells 1- or many-seeded, wing broader above.

558 7. **A. grandiflorum** Boiss. et Hohen., Diagn. Sér. 1, No. 8 (1849) 42 (exclusa var. b); Boiss., Fl. Or. I (1867) 346; N. Busch in Fl. cauc. crit. III, 4 (1907) 131.

Undershrub, many-stemmed; stems and branches elongate, simple, ca. 30 cm high; leaves oblong-linear, elongate, subobtuse, 1—2.5 cm long. Flowers large; sepals 2.5—3 mm long, dark, narrowly white-margined; petals purple, 9.5—10 mm long; filaments of longer stamens dilated at base, edenticulate; fruiting raceme dense, ca. 8 cm long; silicles orbicular-obcordate, 9—10 mm long, 11—12 mm broad (broader crosswise), notch narrow or closed reaching almost the middle of silicle, wings slightly sinuate, 3 times as broad as cell; cell 1-seeded; style very short.

Caucasus: S. Transc. (Armenia). **Gen. distr.:** Iran. Described from Iran (Elburz). Type in Geneva, cotype in Leningrad.

Note. Like many other species of Aethionema, A. grandiflorum is worth cultivation as an ornamental plant.

8. **A. pulchellum** Boiss. et Huet, Diagn. Sér. 2, No. 5 (1856) 43; Boiss., Fl. Or. I (1867) 346; N. Busch in Fl. cauc. crit. III, 4 (1907) 132.

Undershrub, many-stemmed; stems corymbosely branching, 14—28 cm high; leaves linear-oblong, obtuse, 1—2.5 cm long. Flowers large; sepals green, rarely dark, with a rather broad white margin, 2.5—3 mm long; petals pink, ca. 6 mm long; filaments of longer stamens dilated at base, edenticulate; fruiting racemes ca. 4—6 cm across, dense; silicles orbicular-obovate, obcordate, ca. 7 mm long, ca. 6 mm broad, notch closed, deep, wings eroded-dentate or undulate-sinuate (var. kotschyana Trautv.), broader at both sides than the 1-seeded cell; style very short. May—June. (Plate XXXI, Figure 1).

Caucasus: S. Transc. (Karabakh). **Gen. distr.:** Arm.-Kurd. (Turkish Lazistan, Turkish Armenia). Described from Turkish Armenia. Type in Geneva.

Note. Deserving cultivation in gardens.

9. **A. levandovskyi** N. Busch in A. H. Jurjev., VII, 4 (1907) 222; in Fl. cauc. crit. III, 4 (1907) 133.

Undershrub, many-stemmed; stems erect, branching, rather high, 25—40 cm; leaves linear, obtuse or subacute, 1—2 cm long. Flowers medium-sized; petals pink, 4—5 mm long, 2—2.5 times as long as calyx; filaments of longer stamens dilated below, edenticulate; fruiting racemes elongating, 8—10 cm long; immature silicles ca. 6 mm long and broad,
559 obcordate-orbicular, emarginate at base, narrowly so at apex, wings undulate, obsoletely sinuate, at both sides broader than the 1-seeded cell (at apex nearly two times as broad); style very short, hardly visible; seeds when nearly mature 1.25 mm long, 0.75 mm broad.

Caucasus: Tal. Endemic. Described from Talysh (Pir-Shahverdi). Type in Leningrad.

10. **A. armenum** Boiss. in Ann. Sc. Nat. (1842) 191; Fl. Or. I (1867) 347; N. Busch in Fl. cauc. crit. III, 4 (1907) 133. — A. polygaloides Ldb., Fl. Ross. I (1842) 209 (non DC.).

Undershrub, many-stemmed; stems erect, simple, low, 10—15 cm high; leaves short, 1—1.5 cm long, linear, acute. Flowers medium-sized; petals pink, 4—5 mm long, 2—2.5 times longer than sepals; filaments of longer stamens dilated below, edenticulate; fruiting racemes reduced; silicles obovate-orbicular, ca. 7 mm long and broad, obtuse at base, with a broad obtuse notch at apex; wings crenate, at both sides broader than the 1-seeded cell; style rather long, 0.75—1 mm, shorter than notch. May—June.

Caucasus: S. Transc. (Armenia). **Gen. distr.:** As. Min. (Cappadocia), Arm.-Kurd. Described from Turkish Armenia. Type in Geneva, cotype in Leningrad.

11. **A. diastrophis** Bunge in Del. Sem. Horti Dorpat. (1841) 7; Boiss., Fl. Or. I (1867) 347; N. Busch in Fl. cauc. crit. III, 4 (1907) 134; ej. in Trav. Inst. Bot. Ser. I, fasc. III (1936) 363. — Diastrophis cristata Fisch. et Mey. in Ind. sem. II Horti Petropol. (1835) 36 (non A. cristatum DC.).

Undershrub, many-stemmed; stems thin, 15—25 cm high, few-branched; leaves oblong-linear, subobtuse or obtuse, 0.6—1.5 cm long. Flowers medium-sized; petals white-pink (pinkish), ca. 5 mm long, twice as long as sepals; filaments of longer stamens edenticulate; fruiting racemes short, 2—7 cm; silicles erect, broadly oval, ca. 5—7 mm long, ca. 4.5—5.5 mm broad, emarginate at base and apex, convex due to curving of wings around axis; wings radiately plicate, deeply dentate, often acutely incised down to the middle, broader at both sides than the 1-seeded cell; style shorter than notch, 0.5—0.75 mm long. Fl. May, Fr. June—July. (Plate XXXI, Figure 6).

Caucasus: S. Transc. (Nakhichevan ASSR, Karabakh). Endemic. Described from S. Transc. Type in Leningrad.

12. **A. schistosum** Boiss. et Kotschy in Boiss., Diagn. Sér. II, No. 5 (1856) 42; Boiss., Fl. Or. I (1867) 347; N. Busch in Fl. cauc. crit. III, 4 (1907) 135.

Undershrub, many-stemmed; stems low, erect, simple or slightly
560 branching, densely leafy up to summit, 8—20 cm high; leaves oblong-linear or narrowly linear, subacute, 3—12 mm long, 0.5—1.5 mm broad. Flowers

medium-sized; sepals ca. 3 mm long; petals pink, 5–6 mm long; filaments of longer stamens dilated, edenticulate; fruiting raceme short, 2–3.5 cm (resembling a cone), silicles imbricate, large, ca. 11 mm long, ca. 12 mm broad, orbicular-obcordate, broader crosswise, reminiscent of A. arabici by the imbricate arrangement and the width of wings; wings entire, notch deep, closed; style very short. Fr. July.

Caucasus: S. Transc. (Armenia). **Gen. distr.:** As. Min. Described from the Cilician Gates. Type in Geneva, cotype in Leningrad.

13. **A. membranaceum** DC., Syst. II (1821) 561; Prodr. I (1824) 209; Boiss., Fl. Or. I (1867) 346; N. Busch in Fl. cauc. crit. III, 4 (1907) 135.

Undershrub, many-stemmed; stems erect, simple, 20–35 cm high; leaves oblong-linear, almost upright, 8–23 mm long, 1.5–3 mm broad. Flowers rather large; sepals 3–4 mm long; petals pink, 8–8.5 mm long; filaments of longer stamens dilated, denticulate below apex; fruiting racemes subcapitate, dense, 2–3 cm long; silicles imbricate, obcordate-orbicular, ca. 8 mm long and broad, notch deep, broad; wings entire, rounded at apex, at both sides 2–3 times as broad as the 1-seeded cell; style much shorter than notch. May–June. (Plate XXXI, Figure 5).

Caucasus: S. Transc. (Nakhichevan ASSR). **Gen. distr.:** Iran. Described from Iran. Type in Geneva.

14. **A. edentulum** N. Busch in Acta Inst. Bot. Ac. Scienc. Ser. I, III (1936) 363. — Ic.: Ibid., tab. 4, p. 365.

Undershrub, many-stemmed; stems erect, simple, 20–30 cm high, leaves oblong-linear, 15–18 mm long, 2–2.3 mm broad. Flowers medium-sized; sepals 2–3 mm long; petals pink, 5–6 mm long; filaments of longer stamens edenticulate, dilated at base; fruiting racemes subcapitate, dense, 1–2.5 cm long; silicles imbricate, obcordate-orbicular, up to 9–10 mm long and broad, with a deep narrow notch; wings slightly sinuate, rounded at apex, 2–3 times as broad at both sides as the 1-seeded cell; style much shorter than notch. Fl. June, Fr. July–August. (Plate XXX, Figure 3).

563 Dry rocks, dry stony places. — Caucasus: S. Transc. **Gen. distr.:** N. Iran., 1,300–1,600 m. Described from the Nakhichevan ASSR (near Pilav and Urmys) and from Armenia (Daralagez near Kaushuk). Type in Leningrad.

Note. This species is distinguished from the related A. membranaceum DC. by its smaller flowers (sepals 2–3 mm, not 3–4, petals 5–6 mm, not 8–8.5 mm long), filaments of longer stamens edenticulate and not dentate near apex, and by the slightly sinuate silicle wings, not entire.

15. **A. arabicum** (L.) Andrz. ex DC., Syst. II (1821) 560; N. Busch in Fl. cauc.crit. III, 4(1907) 135. — Iberis arabica L., Cent. pl. I (1755) 17; Amoenit. Acad. IV (1759) 278. — Thlaspi arabicum M. B., Fl. taur.-cauc. III (1819) 430. — T. buxbaumii Fisch. ex-hornem., Suppl. Hort. Hafn. (1819) 71. — A. buxbaumii DC., Syst. II (1821) 560; Prodr. I (1824) 209. — Ic.: Buxbaum, Cent. I, p. 2, tab. 5, fig. I.

Annual; stem low, 8–25 cm high, branching; lower leaves ovate, cauline leaves subacute, cordate at base, 1–2.5 cm long, 4–15 mm broad. Flowers small; sepals 1.75–2 mm long; petals pale pink, ca. 3 mm long; filaments of longer stamens dilated, abruptly tapering at apex or with barely visible

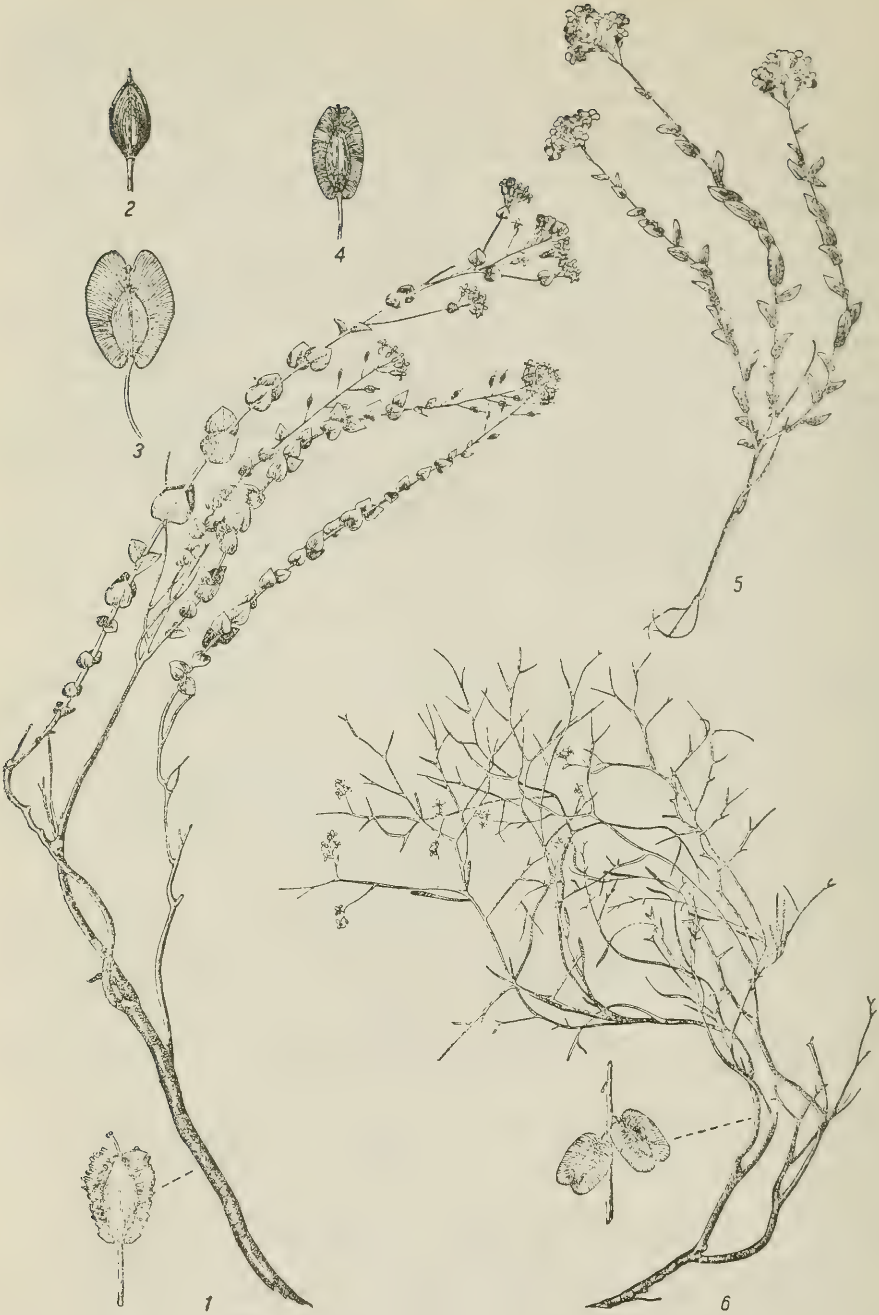

PLATE XXX. 1 – Aethionema cardiophyllum Boiss.et Heldr. and fruit; 2 – A. caespitosum Boiss., fruit; 3 – A. elongatum Boiss., fruit; 4 – A.szovitsi Boiss., fruit; 5 – A.trinervium Boiss., with flowers; 6 – A. spinosum (Boiss.) N.Busch and fruit.

tooth; raceme conelike, 1.5–5 cm long; silicles imbricate, all bilocular, orbicular-oval, obcordate, with deep closed notch, ca. 12 mm long, ca. 10–11 mm broad; wings entire, rounded, at both sides 4 times as broad as 2–3-seeded cells; style 0.5–1 mm long, much shorter than notch. Fl. April–May, Fr. June–July. (Plate XXXI, Figure 7).

Caucasus: E. Transc. (Mtskheta, Akhaltsikh, Kartaliniya, Tbilisi, Gandzha), S. Transc. (Karabakh), Tal. **Gen. distr.:** Bal.-As. Min., Arm.-Kurd., N. Iran., Syria. Described from Arabia and Asia Minor. Type in London.

16. **A. carneum** (Soland.) Fedtsch. in Flora Zap. Tyan-Shanya (1905) No. 176. — Thlaspi carneum Soland. in Russel Aleppo (1794) 257. — A. cristatum DC., Syst. II (1821) 560; Prodr. I (1824) 209; Ldb., Fl. Ross. I, 209; Boiss., Fl. Or. I (1867) 352; N. Busch in Fl. cauc. crit. III, 4 (1907) 137. — Ic.: Soland., l. c., tab. II; Deless., Ic. sel. II, tab. 74.

Annual; stem strongly branching, 3–25 cm high; radical leaves ovate or oblong, petioled, cauline leaves subacute, sessile, cordate or subcordate at base, 1–2.5 cm long, 5–10 mm broad. Flowers minute; sepals 1–2 mm long; petals white (var. albidum O. Ktze.) or red, 2–3 mm long; filaments or longer stamens dilated at base, somewhat connate, edenticulate; silicles usually heteromorphic, some of the lower unilocular, 4–5 mm long and broad, sometimes absent, the rest bilocular, ca. 8 mm long and broad, all obovate-orbicular; wings at both sides broader than cell, distinctly toothed, cleft,
564 cells 2–3-seeded, notch open; style 0.5 mm long, shorter than notch; seeds ca. 1.5 mm long, ca. 0.75 mm broad. (Plate XXXI, Figure 2).

Caucasus: S. Transc. (Kirovabad, Karabakh, Armenia, Nakhichevan ASSR); Centr. Asia: Mtn. Turkm., Amu D., Syr D., T. Sh. **Gen. distr.:** Syria, Palestine, Arm.-Kurd., Iran., Afghanistan. Described from Aleppo. Type in London.

17. **A. cardiophyllum** Boiss. et Heldr. in Boiss., Diagn. Sér. II, No. VIII (1849) 43; Boiss., Fl. Or. I (1867) 350; N. Busch in Acta Inst. Bot. Acad. Sc. Ser. I, III (1936) 360. — A. koenigi Woron. in herb.

Shrub; stems 15–25 cm high, rigid, densely leafy, branching; leaves sessile, rigid, triangular-cordate, acute, the lower opposite. Sepals 3.5–4 mm long; petals pink, 5–6 mm long; filaments of longer stamens denticulate near apex; fruiting raceme elongated; silicles orbicular-oval or oval, truncate-emarginate at apex (notch shallow, very broad); ca. 6–6.5 mm long, 5–6 mm broad (including wings); wings dilated from base to apex, slightly broader than cells, radially nerved, dentate; style longer than notch, 2.5–3 mm long; seeds rufous. May. (Plate XXX, Figure 1).

Ca. 1,500–2,000 m. — Caucasus: S. Transc. **Gen. distr.:** As. Min. Described from Asia Minor (Budur). Type in Geneva, cotype in Leningrad.

18. **A. salmasium** Boiss., Fl. Or. I (1867) 350; N. Busch in Fl. cauc. crit. III, 4 (1907) 138.

Undershrub; stems erect, 10–40 cm high; leaves sessile, 5–7-veined, lower leaves oblong-lanceolate, rounded or slightly tapering at base, upper leaves broader, ovate-oblong or sometimes oval, 15–30 mm long, 9–12 mm broad, deeply cordate, all leaves acute. Flowers medium-sized; sepals 3–3.5 mm long; petals sulfur-yellow, 6–7 mm long; all filaments entire

(565)

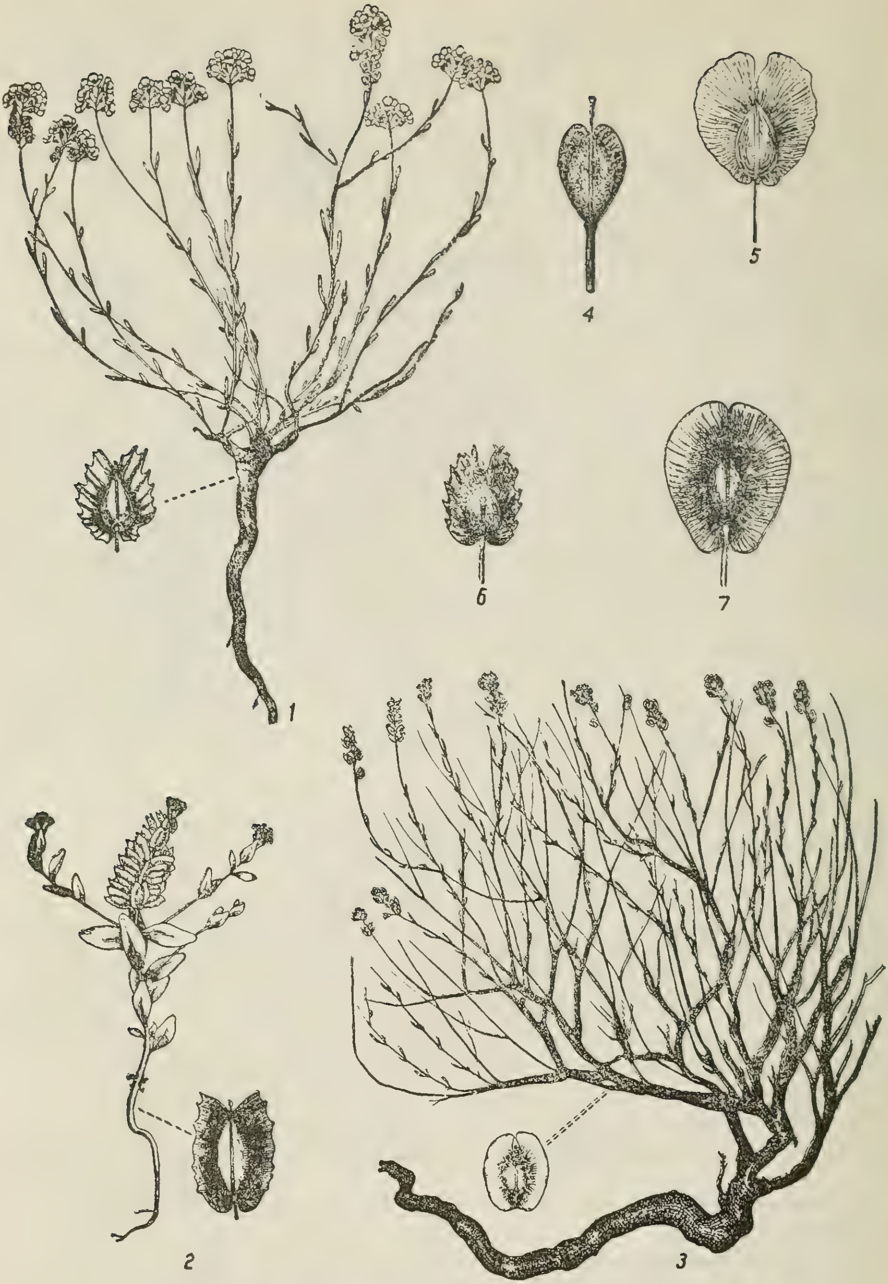

PLATE XXXI. 1 – Aethionema pulchellum Boiss.et Huet and fruit; 2 – A. carneum (Sol.) Fedtsch. and fruit; 3 – A. transhyrcanum (Czerniak.) N.Busch and fruit; 4 – A. salmasium Boiss., fruit; 5 – A. membranaceum DC., fruit; 6 – A. diastrophis Bge., fruit; 7 – A. arabicum (L.) Andrz., fruit.

(edenticulate); fruiting raceme 3—7 cm long; silicles bilocular, obcordate-oval, 8—9 mm long, 4—5.5 mm broad; wings entire, rounded at apex and as broad as the 2-seeded cells; style 3—5 mm long, much longer than notch. Fr. July. (Plate XXXI, Figure 4).

Stony slopes.— Caucasus: S. Transc. **Gen. distr.:** Iran. Described from Shahpur, Iran (formerly Salmas). Type in Geneva.

567 Section 4. **IBERIDELLA** Boiss. in Ann. Sc. Nat. 2 Sér. XVII (1842) 188 (pro gen.); Fl. Or. I (1867) 341 (pro sect. Aethionematis) (partim); N. Busch in Fl. cauc. crit. III, 4 (1907) 139.— Silicle wingless, cells 2-seeded. Filaments free, edenticulate. Leaves auricled or hastate.

19. **A. trinervium** (DC.) Boiss., Fl. Or. I (1867) 342; N. Busch in Acta H. Jurjev. VII, No. 4 (1907) 225 (typicum N. Busch) et in Fl. cauc. crit. III, 4 (1907) 139.— Hutchinsia trinervia DC., Syst. II (1821) 387.— Ic.: Delessert, Ic. sel. II, tab. 53.

Undershrub; stem 7—20 cm long; leaves rigid, 3-veined, oblong or linear-lanceolate or ovate-oblong (var. boissieri N. Busch), lower leaves tapering at base, upper leaves obtusely subcordate-amplexicaul at base. Flowers rather large; sepals ca. 3 mm long; petals whitish, ca. 6 mm long; silicles oblong-linear, truncate-rounded at apex; style as long as silicle. May. (Plate XXX, Figure 5).

Ca. 1,500 m.— Caucasus: S. Transc. **Gen. distr.:** Arm.-Kurd., Iran. Described from Alwand (Iran). Type in Geneva.

20. **A. sagittatum** Boiss., Fl. Or. I (1867) 342; N. Busch in Acta H. Jurjev. VII, No. 4 (1907) 224; in Fl. cauc. crit. III, 4 (1907) 140.

Undershrub; stem 10—25 cm high; leaves rigid, many-veined, oblong or lanceolate, subacute, 1.5—2 cm long, 3—5 mm broad, deeply and acutely hastate at base. Flowers rather large; sepals 2.5—3.5 mm long; petals whitish, 5—6 mm long; silicles oblong-linear, tapering at base, slightly truncate at apex, immature silicles 5—5.5 mm long, style 2—3 mm long. Fl. May, Fr. June—July.

Caucasus: S.Transc.; Centr. Asia: Syr D., Pam.-Al. **Gen. distr.:** Iran. Described from Iran (Isfahan, Shiraz). Type in Geneva, cotype in Leningrad.

21. **A. heterophyllum** Boiss., Fl. Or. I (1867) 343; N. Busch in Act. H. Jurjev. VII, No. 4 (1907) 225; in Fl. cauc. crit. III, 4 (1907) 140.

Perennial, stoloniferous plant, with shoots elongate, numerous, prostrate, leafless, branching; stems cespitose, low, densely leafy; lower leaves and leaves of sterile shoots narrowly linear or oblong-linear, rigid, tapering at base, upper leaves oblong, slightly amplexicaul at base, all leaves dentate-scabrous at margin. Racemes apical, densely corymbose-capitate; flowers medium-sized; sepals ovate, hyaline-margined, ca. 2.5 mm long; petals obovate, obtuse, tapering into a claw, ca. 5 mm long; silicle elliptic, tapering at apex, ca. 6 mm long.

568 Alpine zone.— Caucasus: S. Transc. **Gen. distr.:** Iran. Described from Iranian Talysh. Type in Leningrad.

22. **A. caespitosum** Boiss., Fl. Or. I (1867) 343; N. Busch in Fl. cauc.-crit. III, 4 (1907) 141.

Perennial, densely cespitose; stems low, scarcely exserted from the cushion, 2.5–6 cm high; leaves arranged in a dense cushion, rigid, small, linear, acute, mucronate, membranous-serrate, keeled beneath, cauline leaves with minute setaceous auricles, ca. 6 mm long, ca. 1–1.5 mm broad. Flowers arranged in few-flowered umbelliform racemes, large; sepals ca. 2.5 mm long; petals pink, oblong-spatulate, ca. 6–7 mm long; silicles elliptic, tapering at apex, truncate, ca. 6 mm long; style 1.3–1.5 mm long. (Plate XXX, Figure 2).

Caucasus: S. Transc. (2,700 m). **Gen. distr.:** Arm.-Kurd. Described from Turkish Armenia. Type in Geneva, cotype in Leningrad.

Genus 674. **COCHLEARIA** * L.**

L., Sp.pl.(1753) 647; Gen.pl.ed.5 (1754) 292; Hayek, Crucifer.-Syst.(1911) 295.

Sepals erect, not saccate; petals short-clawed, white or lilac; filaments entire, free. A triangular nectariferous gland at both sides of the shorter stamens. Ovary sessile, style very short; silicle subglobose or ellipsoidal or pyriform, laterally slightly compressed, 2- or few-seeded; valves with prominent midrib up to apex, walls of epidermal cells of septum thin, undulate; seeds biseriate, cotyledons flat, embryo pleurorhizal. Hairs simple or absent. — Annuals or biennials, with entire spatulate leaves.

An Arctic genus. The number of its species has not been firmly established. There are 4 in the Soviet Union.

Cochlearia sp. — in interglacial (Mindel-Riss) deposits of Angara River — Sayans area (Elan).

1. Petals 2–2.5 mm long, silicles 4 mm long, 2 mm broad . . . . 2. **C. lenensis** Adams.
+ Petals 3.5–4 mm long, silicles 5–7.5 mm long, 3–4 mm broad . . . . . 2.
2. Cauline leaves nearly none, radical leaves reniform, silicles oval . . . . 4. **C. groenlandica** L.
+ Stems leafy, radical leaves oblong or orbicular-oval, silicles broadly ellipsoidal or globose-oval . . . . 3.
569 3. Silicles broadly ellipsoidal, plant small . . . . . 1. **C. arctica** Schlechtd.
+ Silicles globose-oval, more inflated, plant larger . . . . 3. **C. oblongifolia** DC.

Economic importance. The fresh plants taste like garden cress — Lepidium sativum — and may be eaten as salad. They contain volatile oil, so the fresh leaves and juicy stems are used to counter scurvy.

1. **C. arctica** Schlechtd. in DC., Syst. II (1821) 367; N. Busch, Fl. Sib. et Or. Extr. I (1913) 121; Kom., Fl. Kamch. II (1929) 165; Kryl., Fl. Zap. Sib. VI

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* From Latin cochlea – snail.

** Treatment by N.A. Bush.

(1931) 1274. — C. officinalis, C. anglica, C. danica, C. fenestrata Ldb., Fl. Ross. I, 157, 158. — C. officinalis, C. danica Shmal'g., Fl. I, 92. — Ic.: Anderss. och Hesselm., Spetsberg. och Beeren Eil. (1900) fig. 20 (sub C. officinali var. arctica); N. Busch, l. c., 123 et tab. geogr. 124.

Biennial; stem 7—40 cm high; radical leaves petioled, oblong-ovate or oval; blade rounded or even reniform at base or gradually tapering into a petiole; cauline leaves oblong or ovate, sessile or tapering into a short petiole, entire or dentate, the uppermost amplexicaul, cordate at base. Petals 3.5—4 mm long; fruiting pedicels 3—8 mm long; silicles broadly ellipsoidal, 5—7 mm long, 1.5—3.5 mm broad; style 0.25—0.5 mm long; cells 6—9-seeded; seeds brown, ca. 1 mm long, 0.6—0.75 mm broad. June—July.

Shores of the Arctic Ocean, clayey hills and sandy places in the Arctic zone. — Arctic: Arc. Eur., Nov. Z., Arc. Sib., Chuk., An.; Far East: Kamch. **Gen. distr.**: Arc. Eur., Arc. N. Am. Described from Arctic Siberia. Type in Berlin.

2. **C. lenensis** Adams in DC., Syst. II (1821) 367; Ldb., Fl. Ross. I (1842) 158. — C. arctica f. lenensis N. Busch, Fl. Sib. et Or. Extr. I (1913) 122.

Biennial, similar to the preceding but flowers small: petals 2—2.5 mm long; silicles the same in shape, but smaller: 4 mm long, 2 mm broad. June—July.

Arctic zone, clayey and sandy grassless places. — Arctic: Arc. Sib. (mouth of the Lena River). Described from the Lena River. Type in Leningrad.

3. **C. oblongifolia** DC., Syst. II (1821) 363; Ldb., Fl. Ross. I, 157. — C. arctica var. oblongifolia N. Busch, Fl. Sib. et Or. Extr. I (1913) 122.

Biennial, larger than the two preceding, resembling them but fruiting pedicels 5—12 mm long; silicles more inflated, globose-oval, 5—7.5 mm long, 3—5 mm broad; seeds 1 mm long, 0.8 mm broad. June—July.

570 Seacoasts, clayey and sandy grassless places. — Arctic: Chuk., An.; Far East: Kamch., Okh., Uda, Sakh. **Gen. distr.**: Arctic N. Am. Described from Kamchatka and St. Paul Island. Type in Geneva.

4. **C. groenlandica** L., Sp. pl. (1753) 647; DC., Syst. II (1821) 366; Ldb., Fl. Ross. I (1842) 157.

Biennial, similar to the preceding species but radical leaves petiolate, reniform, entire, cauline leaves nearly none. Silicles oval, ca. 7 mm long, ca. 4 mm broad; usually 4 ovules in each cell, seeds usually 2. June—July.

Clayey and sandy grassless places. — Arctic: Arc. Eur. **Gen. distr.**: Arc. N. Am., Greenland. Described from Europe. Type in London.

Genus 675. **PSEUDOCAMELINA** N. BUSCH*

N. Busch in Journ. Soc. Bot. de Russie 13 (1928) No. 1—2, p. 113. — Cochlearia sect. Pseudocamelina Boiss., Fl. Or. I (1867) 247.

Sepals erect, not saccate. Petals white. Filaments edenticulate, somewhat thickened at base. Triangular crescent-shaped lateral nectariferous glands at both sides of shorter stamens with sublinear appendages directed toward the middle. Median glands none. Anthers oblong. Fruit a linear, somewhat laterally compressed or ovoid silicle. Epidermal cells of septum polygonal. Embryo pleurorhizal. — Biennials or (rarely) perennials, many-stemmed, with thin, rod-shaped, dichasially many-branched, nearly leafless stems, radical leaves fleshy, pedicels filiform.

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* Treatment by N.A. Bush.

Iranian genus of 7 species; one occurs in the USSR.

Note. Pseudocamelina N. Busch is distinguished from Cochlearia L. by its unique manner of branching, nectariferous glands, shape of fruit and epidermal cells of septum, and also by its distribution.

1. **P. szovitsi** (Boiss.) N. Busch, l. c. — Cochlearia szovitsi Boiss., Fl. Or. I (1867) 248. — Ic.: N. Busch, l. c.

Biennial; stem 45—80 cm high; rosette leaves obovate; petals 2.5 mm long; fruiting pedicels spreading, 7—11 mm long. Silicle oval-elliptic, 4.5—6.5 mm long; cells 2—3-seeded.

Dry stony places and rocks. — Caucasus: S. Transc. **Gen. distr.**: Iran. Described from the Shovits (Szovits) specimen from Koshadar (Nakhichevan ASSR). Type in Geneva.

571 Genus 676. **PELTARIOPSIS** * N. BUSCH**

N.Busch in Monit.Jard.Botan.Tiflis.Nouv.Série, Livr.3—4 (1927) 8.

Sepals erect, not saccate. Petals white. Filaments edenticulate, often dilated at base. Lateral nectariferous glands crescent-shaped, connate to median glands at both sides of shorter stamens by broad appendages; median glands subrhombic, suborbicular or emarginate outside, acuminate inside. Ovary on very short gynophore. Style very short, persistent. Stigma obtuse. Fruit a 2-valved silicle, dorsally flattened, obliquely elliptic; valves flat, netted-veined, sometimes with obscure midrib. Cells 4—5-seeded; seeds flat, embryo pleurorhizal. Septum with numerous parallel walls of the large, long epidermal cells. — Glabrous biennials.

Iranian genus of 3 species; one occurs in the USSR.

Note. Peltariopsis N. Busch is distinguished from Cochlearia L. by a special shape of median glands, shape of fruit and epidermal cells of the septum, and by its distribution.

1. **P. grossheimi** N. Busch, l. c., 10, cum icone p. 9.

Biennial, low plant; ca. 20 cm high, strongly branching from base, completely glabrous, glaucous; taproot rather thick; lower leaves orbicular, long-petiolate, oblanceolate, obtuse at apex, tapering at base. Racemes dense; sepals oblong, 2.5 mm long, 1—1.5 mm broad; petals rotund, narrowly clawed, 4—4.5 mm long, 2.5 mm wide; filaments not dilated at base; median nectariferous glands emarginate outside; fruiting pedicels filiform, spreading, 9—11 mm long; siliques ca. 6 mm long, ca. 3 mm broad, flattened, with obscure midrib; style 0.5 mm long; cells 4—5-seeded, seeds rufous, rather flat, 1.25 mm long, 0.75 mm broad. May.

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* From Peltaria and the Greek opsis — species.

** Treatment by N.A. Bush.

Calcareous rocks, 600—900 m. — Caucasus: S. Transc. (Nakhichevan ASSR). Described from near the Negram railroad station. Type in Leningrad.

Genus ★ 677. **PSEUDOSEMPERVIVUM** * (BOISS.) GROSSH.**

Grossh. in Fl. Kavk.II (1930) 159.— Cochlearia sect. Pseudosempervivum Boiss., Fl.Or.I *1867) 246; Schulz in Engl. et Pr., 17b (1936) 462.

Sepals not saccate. Petals white, short-clawed. Filaments straight. Anthers ovate. Nectariferous glands at both sides of the shorter stamens, 572 median glands nearly null. Silicles elliptic, usually with inflated valves. Valves with midrib.— Completely glabrous, glaucous, biennials, with rosette of fleshy, radical leaves, stout stem, densely leafy at base, pyramidally branched.

A Near Asia genus of 3 species; one of which might be found in the USSR.

★1. **P. karsianum** (N. Busch) Grossh. in Fl. Kavk. II (1931) 159.— Cochlearia karsiana N. Busch in Fl. cauc. crit. III, 4 (1908) 176.

Biennial; stem 50—60 cm high; radical leaves rather large, obovate-cuneate, sinuate or obtusely crenate at apex, cauline leaves semiamplexicaul, obovate-orbicular, entire, obtusely auricled at base; leaves of branches linear, short. Sepals ca. 1.5 mm long; petals white, ca. 3 mm long; fruiting pedicels ascending, 3—4 mm long; silicles elliptic, tapering at base, ca. 6 mm long, ca. 2—2.5 mm broad; cells 1—2-seeded; style 0.5—0.75 mm long. June.

Rocks.— **Gen. distr.:** Arm.-Kurd. Described from rocky places of Kars region (Ashikh-Dade), southern slope of the Kara Dag Mountain, 1,400—1,860 m. Type in Leningrad.

Note. Reported in case it is found within the Soviet Union.

Genus 678. **COLUTEOCARPUS** † BOISS.**

Boiss.in Ann.Sc.Nat.Sér.2, XVII (1842) 162; Hayek, Crucif.-Syst.(1911) 296.

Sepals erect, not saccate. Petals clawed, white or pink. Filaments entire, free. A crescent-shaped nectariferous gland at both sides of the shorter stamens with a long appendage directed toward the longer stamens, the appendage nearly joined outside each pair of the longer stamens. Ovary sessile, style short. Fruit an ellipsoidal or ovoid silicle, few-seeded, with thin coriaceous, netted-veined valves; septum developed only at margin, epidermal cells polygonal, without parallel dividing walls. Seeds not marginate, on ovule stalks adnate to septum. Cotyledons flat, embryo pleurorhizal. Hairs simple.— High mountainous perennials, densely cespitose.

Two species. The genus is common to Near Asia and the Caucasus.

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* From pseudos — false, and Sempervivum — genus of the family Crassulaceae.

** Treatment by N.A. Bush.

† Colutea — genus of Leguminosae, and the Greek carpos — fruit.

1. **C. vesicaria** (L.) Holmboe in Bergens Mus. Aarbog (1907) No. 13, 6; Fedde, Repert. VI (1908) 128.— C. reticulatus Boiss. in Ann. Sc. Nat.
573 Sér. 2, XVII (1842) 162; Fl. Or. I (1867) 306; N. Busch in Fl. cauc. crit. III, 4 (1908) 148.— Vesicaria reticulata Lam., Illustr. (1808) tab. 559, f. 2.— Alyssum vesicaria L., Sp. pl. (1753) 910.— Lagovskia physocarpa Trautv. in Bull. phys.-math. Acad. St.-Pétersb. XVI (1858) 321.— Ic.: Schulz, Nat. Pflzf. 17b (1936) fig. 252.

Perennial; stem 8—20 cm high; leaves more or less rigid, radical leaves densely rosetted, long-tapering at base, linear-oblong, 3—4-toothed on each side, cauline leaves entire, ovate or oblong, acute. Flowering raceme capitate, later somewhat elongated, 4—5 cm long; sepals 4—4.5 mm long; petals ca. 8 mm long; silicles glabrous, 2—3 cm, usually 2.5 cm long, 12—25 mm broad, acuminate at both ends; style thin, 2—2.5 mm long; seeds oblong, ca. 3 mm long, ca. 2 mm broad. March—May.

Taluses of the forest and high-mountain zone, rare, 800—2,900 m.— Caucasus: Greater Caucasus, E. and S. Transc. **Gen. distr.**: As. Min., Syria, Arm.-Kurd., Iran. (var. boissieri (Hausskn.) N. Busch, l. c., 149). Described from Turkish Armenia. Type in Paris.

Genus 679. **DIDYMOPHYSA** * BOISS.**

Boiss. in Ann. Sc. Nat. Sér. 2, XVII (1842) 179; Hayek, Crucif.-Syst. (1911) 297.

Sepals erect, not saccate. Petals clawed, white. Filaments entire, free. A crescent-shaped nectariferous gland at both sides of the shorter stamens with a short appendage directed toward the longer stamens. Ovary sessile. Style short. Silicle inflated, geminate, emarginate at both ends. Valves netted-veined, thin-coriaceous, ovate. Septum narrow, linear. Seeds immarginate, pendulous, on short free stalks, 2 in each cell. Cotyledons flat. Embryo pleurorhizal. Hairs absent.— High-mountain perennials, cespitose, with glabrous palmatisect [sic] leaves.

Near and Central Asian genus of 3 species; two are common to the Soviet Union.

1. Leaves 3—5-partite . . . . 1. **D. aucheri** Boiss.
+ Leaves nearly always entire . . . . 2. **D. fedczenkoana** Rgl.

1. **D. aucheri** Boiss. in Ann. Sc. Nat. 2, Sér. XVII (1842) 179; Fl. Or. I (1867) 318; N. Busch in Fl. cauc. crit. III, 4 (1907) 144.

Perennial, glabrous, low plant loosely cespitose; stems creeping, with ascending sterile shoots, 7—15 cm long; leaves thickish, tapering into a
574 petiole, cuneate, deeply divided into 3—5 obtuse, long lobes. Raceme short, even in fruit, 1—2 cm long, 8—12-flowered; sepals ca. 2 mm long, reddish, white-margined; petals 4—5 mm long; fruiting pedicels filiform, ascending-erect, 7—9 mm long; silicles 4—8 mm long, ca. 8—13 mm broad; style short, 0.5—1 mm; placentae nearly joined with each other at border of septum. July.

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* From the Greek didymos — twin, and physa — bubble.

** Treatment by N.A.Bush.

Mountain top taluses, 2,500–4,100 m. — Caucasus: S. Transc. (Alagez, its peaks and other high mountains); Centr. Asia: Pam.-Al. **Gen. distr.:** Iran., Arm.-Kurd. (Great Ararat). Described from the Demavend and Alwand mountains in Iran. Type in Leningrad.

Note. Varies in the width of leaf-lobes.

2. **D. fedczenkoana** Rgl. in E. Regel, Opis. nov. vidov No. 10 in A. P. Fedchenko, Puteshestv. v. Turkestan, no. 18 (1881) 8; B. Fedch., Rastit. Turkestana (1915) 440.

Perennial, glabrous, loosely cespitose plant; stems creeping, with thin ascending shoots, 5–25 cm long; leaves thickish, cuneate-oblong or cuneate-obovate, tapering into a short petiole, rounded-obtuse, usually all leaves entire, rarely the uppermost shortly 2–3-lobed or 1–2-toothed. Raceme corymbose short even in fruit; sepals ovate, obtuse, reddish, ca. 2 mm long; petals oblong-obovate, slightly exceeding sepals, ca. 3 mm long, entire; ovary oval-orbicular, flattened, style short; stigma capitate; fruiting pedicels filiform, declinate, ca. 5 mm long; silicle sessile, geminate, 3–10 mm long, 5–15 mm broad, 2-valved, cells 1–2-seeded; valves coriaceous, inflated, spherical; septum narrowly linear; style short; seeds elliptic, oblong, flattened. June–July.

Taluses and moraines, 2,400–4,000 m. — Centr. Asia: T. Sh., Pam.-Al. Endemic. Described from Kokan, from Dzhiptyk Pass in the glacial region of Karasuk. Type in Leningrad.

Genus 680. **DILOPHIA** * THOMS.**

Thomson in Hooker's Journ. IV, T.12, V (1853) 19.

Sepals divergent, dilated at apex, persistent. Petals not divided, tapering at base, white or lilac. Filaments entire, free. A crescent-shaped nectariferous gland at both sides of the shorter stamens with a thick appendage directed toward the longer stamens. Ovary sessile, style thick, stigma truncate. Fruit slightly compressed at sides, cordate-orbicular, with persistent style; valves carinate. Seeds few in each cell on thick stalks; 575 cotyledons flat, embryo pleurorhizal or obliquely notorrhizal. Hairs simple. — Tiny plant, with prostrate branches and spatulate leaves.

High mountainous Central Asian genus of 5 species, one of which is common to the Soviet Union.

1. **D. salsa** Thomson in Hooker's Journal of Botany vol. V (1853) 20 et vol. IV (1852) tab. 12; Hook., Fl. of Brit. India I (1875) 161; O. et B. Fedtsch., Consp. I (1906) 82. — D. kaschgarica Rupr., Sert. Tianschan. (1869) 40.

Biennial, small plant, 2–10 cm high, procumbent, strongly branching from the very base, branches divaricate, prostrate; leaves narrowly spatulate, oblong or linear, entire or sinuate-dentate. Flowers many, racemes crowded in dense umbels, leafy at base; sepals broadly elliptic or oval, ca. 1.5–2 mm long, often reddish; petals obovate, cuneate, white, lilac or completely lilac at throat, 2.5–3.4 mm long; silicles glabrous, valves with green, small, flat, finally recurved appendages; cells 2-seeded; seeds falling with valves. June–July.

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* From the Greek dis — double, and lophos — crest, appendage.

** Treatment by N.A.Bush.

Damp sandy riverbanks, solonetzic coasts, clayey solonetzic deserts, solonchaks, river gravels, 3,400–4,800 m.— Centr. Asia: T. Sh., Syr D., Pam.-Al. **Gen. distr.:** W. Tib. Described from western Tibet. Type in London.

Genus 681. **PACHYPHRAGMA** * (DC.) N. BUSCH**

N.Busch in Fl.cauc.crit.III, 4 (1908) 150; Pachyphragma sect. Thlaspidis generis DC., Syst.II (1821) 373; Pterolobium (gen.) Andrz.in DC., Syst.II (1821) 373 (non R.Br.in Salt Abyss. (1814) App.64 gen. Leguminosarum).

Sepals not saccate, divergent. Petals clawed, white, entire. Filaments free, edenticulate. Silicle laterally compressed, obcordate, broader than long, with a broad obtuse wing on each valve. Valves corinate, oval. Septum thick (ancient character), consisting of two membranes. Seeds smooth, usually 2 in each cell, pendulous from apex. Embryo pleurorhizal.— Perennial, with truncate [?], undefined (monopodial) thick rhizome.

An ancient monotypic genus, probably Early Tertiary.

1. **P. macrophyllum** (Hoffm.) N. Busch in Fl. cauc. crit. III, 4 (1908) 151.— Thlaspi macrophyllum Hoffm. in Comment. soc. phys. med. mosq. I (1805) 7; Ldb., Fl. Ross. I (1842) 162; Shmal'g., Fl. I (1895) 95.— T. latifolium M. B., Fl. taur.-cauc. II (1808) 99; III (1819) 430.— Pterolobium biebersteini Andrz. ex DC., Syst. II (1821) 373.— P. macrophyllum Rupr., Fl. Cauc. (1869) 125.— Ic.: Delessert, Ic. sel. I, tab. 51; Schulz in E.-Pr. Nat. Pflzf. 17b (1936) 449, fig. 271, A–E.— Exs.: HFR No. 253. 576

Perennial; stem 20–40 cm high; leaves eroded-dentate, radical leaves long-petiolate, large, cordate or reniform, 4–12 cm long and broad, together with petioles completely glabrous, rarely petioles and veins of young leaves densely pubescent, petioles dilated at base; cauline leaves ovate, short-petioled. Fruiting racemes 5–7 cm long; sepals yellow, ca. 3 mm long; petals white, 8–10 mm long; fruiting pedicels divaricate to stem, ca. 1.5–2 cm long; silicles large, 8–10 mm long, 15–18 mm broad, broad-winged, broader than long, broadly cordate, with deep, narrow notch at apex; wings much broader than cells, radially veined, valves strongly carinate, stigma subsessile; cells 4-ovuled but usually only 1–2-seeded; seeds smooth. April–June. (Plate XXXII, Figure 4).

Shady broad-leaved forests, up to 1,700 m.— Caucasus: Cisc., Dag., W. and E. Transc. **Gen. distr.:** Turkish Lazistan. Described from the Georgian (SSR) forests between the villages of Ananur and Kaishaur. Type in Leningrad.

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* From the Greek pachys – thick, and phragma – partition.

** Treatment by N.A. Bush.

(577)

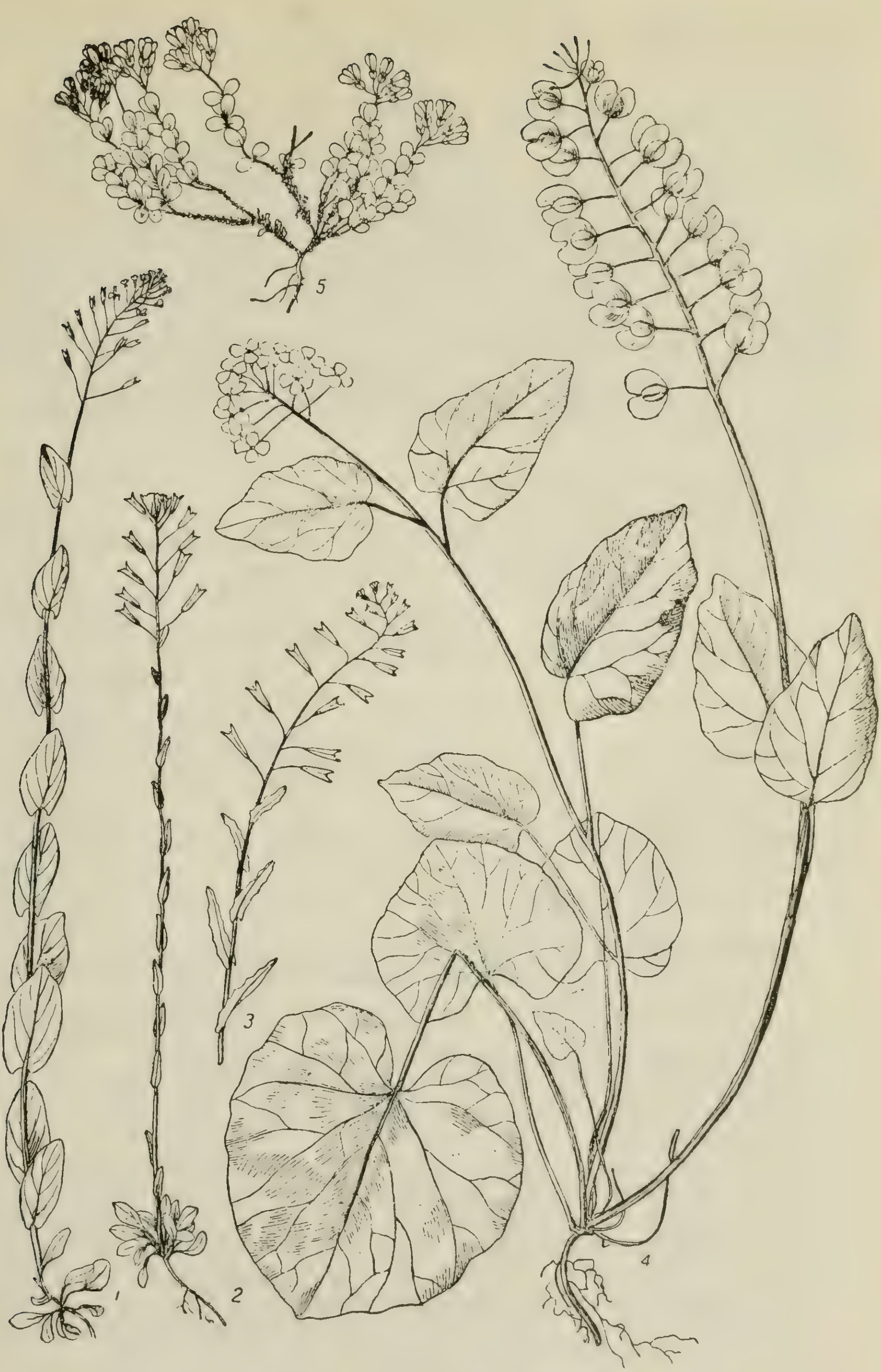

PLATE XXXII. 1 – *Carpoceras brevistylum* N.Busch; 2 – *C. stenocarpum* Boiss.; 3 – *C. hastulatum* Boiss.; 4 – *Pachyphragma macrophyllum* (Hoffm.) N. Busch; 5 – *Eunomia rotundifolia* C.A.M.

Genus 682. **THLASPI** * (TOURN.) L.**

(Tourn.) ex L., Gen.pl.ed.1 (1737) 193; L., Sp.pl. (1753) 645; Gen.pl.ed.5 (1754) 719.

Sepals divergent, not saccate. Petals clawed, always entire, white or pink. Filaments free, edenticulate. A crescent-shaped nectariferous gland at both sides of shorter stamens with a short appendage directed toward the longer stamens. Ovary sessile. Silicle flattened in the median plane (perpendicular to septum), orbicular, oblong, elliptic, obovate, obcordate or obtriangular (cuneate), usually with notch around style, rarely truncate. Valves carinate, nearly always winged at keel, especially at apex. Cells two- to many-seeded. Seeds sulcate, punctate, or smooth. Septum with cells divided perpendicularly to their length. Embryo pleurorhizal. — Annual or perennial glabrous herbs, with entire or dentate leaves, cauline leaves nearly always more or less cordate-amplexicaul.

579 A predominantly Mediterranean genus of 70 species, 19 of which are found in the USSR.

1. Flowers pink . . . . 2.
+ Flowers white . . . . 3.
2. Perennial, with stout multicipital root. Cauline leaves small, obovate, sessile, amplexicaul. Silicles oblong, wingless . . . . 19. **T. rostratum** N. Busch.
+ Biennial with thin root. Cauline leaves large, rounded-oval, amplexicaul. Silicles obovate, narrowly winged . . . . 11. **T. roseolum** N. Busch.
3. Silicles elliptic, not notched at apex. Valves carinate, nearly wingless . . . . 18. **T. pumilum** Ldb.
+ Silicles orbicular or obcordate or obtriangular, winged . . . . 4.
4. Seeds sulcate . . . . 5.
+ Seeds smooth . . . . 6.
5. Silicles broadly winged. Cells 5—6-seeded. Pedicels ascending-erect . . . . 1. **T. arvense** L.
+ Silicles narrow-winged. Cells 2—3-seeded. Pedicels divaricate . . . . 2. **T. hueti** Boiss.
6. Silicles orbicular, with very narrow notch at apex . . . . 7.
+ Silicles obcordate, with broad or oblong-cuneate notch at apex . . . 11.
7. Silicle notch very narrow; margins closed. Style as long as notch . . . . 3. **T. orbiculatum** Stev.
+ Notch broader; margins not closed. Stigma subsessile . . . . 8.
8. Stem branching. Raceme very dense. Cells 8—10-seeded . . . . . 9.
+ Stem usually simple. Raceme dense or loose. Cells 4—5-seeded Wing netted-veined . . . . 10.
9. Silicle with strongly parallel-nerved wing, nerves transversely directed. Silicles erect, borne on ascending pedicels, imbricating each other, ca. 12 mm across . . . . 4. **T. armenum** N. Busch.
+ Silicle with obscurely netted-veined wing. Silicles 8—9 mm across . . . . 5. **T. platycarpum** Fisch. et May.
580
10. Small plant. Stem low. Fruiting raceme dense. Silicle large, wing broad . . . . 6. **T. kotschyanum** Boiss. et Hoh.

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* From the Greek thlao — flatten, and aspis — shield (according to the shape of the fruit).

** Treatment by N.A. Bush.

+ Stem rather tall. Raceme very loose. Wing narrower . . . . 7. **T. szovitsianum** Boiss.

11. Leaves not auricled . . . . 13. **T. exauriculatum** Kom.

+ Leaves auricled, amplexicaul . . . . 12.

12. Wing more or less evenly developed. Silicles obcordate. Style shorter than notch, or stigma sessile . . . . 13.

+ Wing tapering and diminishing toward base of silicle. Silicles oblong or broad-triangular. Style longer than notch . . . . 15.

13. Silicle lobes [valves] angular, almost like Capsella bursa-pastoris (L.) Medic., with conspicuous radial nerves. Fruiting raceme often short. Stigma sessile. Leaves dentate . . . . 8. **T. umbellatum** Stev.

+ Silicle lobes [valves] orbicular, with inconspicuous radial nerves or less conspicuous than in T. umbellatum Stev. Fruiting raceme always elongating. Leaves nearly always entire . . . . 14.

14. Petals twice as long as calyx. Stigma subsessile. Glaucous plant . . . . 9. **T. perfoliatum** L.

+ Petals 3–4 times as long as calyx. Style almost as long as notch . . . . 10. **T. annuum** C. Koch.

15. Petals 3–5 mm long. Silicles 4–6 mm long. Style slightly exceeding notch . . . . 14. **T. praecox** Wulf.

+ Petals 6–8 mm long. Silicles 7–13 mm long. Style as long as breadth of silicle . . . . 16.

16. Perennial with short leafy shoots in addition to stems (Siberia, Central Asia) . . . . 12. **T. cochleariforme** DC.

+ Biennials . . . . 17.

17. Silicles 8–13 mm long . . . . 18.

+ Silicles 7–8 mm long (Transcaucasia) . . . . 15. **T. freyni** N. Busch.

18. Petals 6–6.5 mm long, silicles 8–10 mm long . . . . 16. **T. macranthum** N. Busch.

+ Petals 6.5–7.5 mm long, silicles 10–13 mm long . . . . 17. **T. ferganense** N. Busch.

Section 1. **NOMISMA** DC., Syst. II (1821) 373, 375. — Silicle broadly winged, orbicular, emarginate at apex. Seeds sulcate.

581 1. **T. arvense** L., Sp. pl. (1753) 646; Ldb., Fl. Ross. I, 162; Shmal'g., Fl. I, 94; N. Busch in Fl. cauc. crit. III, 4 (1908) 156, 768; Fl. Sib. et Or. Extr. I (1913) 110; Kom., Fl. Kamch. II (1929) 164; Kryl., Fl. Zap. Sib. VI (1931) 1271. — T. collinum MB., Fl. taur.-cauc. II (1808) 99; Ldb., Fl. Ross. I, 163. — Ic.: N. Busch, Fl. Sib. et Or. Extr. I, 112 (var. baicalense et fructus var. typicae) et tab. geogr. 113.

Annual, glabrous; stem 20–50 cm high, simple or branching; radical leaves petiolate, obovate-oblong, cauline leaves sessile, oblong-lanceolate, acute-sagittate at base, all leaves more or less dentate. Racemes elongating after flowering; sepals 2–2.5 mm long; petals white, oblong, 3–5 mm long; fruiting pedicels 5–18 mm long; silicles with narrow notch, 12–18 mm long, 11–16 mm broad, orbicular-oval or orbicular (var. baicalense (DC.) C. A. M.) with very short style; wings ca. 3 mm broad; cells 5–7-seeded; seeds brown, 1.75–2.5 mm long, 1.25–1.75 mm broad. April–August. (Plate XXX, Figure 4).

Solonetzes, dry valleys, waste land and weedy places. — European part: all areas; Crim., Caucasus, and Transc.; entire forest zone of Siberia; Far East: Ze.-Bu., Okh., Uss.; Centr. Asia: Irt., Balkh., T. Sh., Pam.-Al. **Gen. distr.:** All Europe, Iran., N. Mong., Him., Jap.-Ch. Introduced into N. Am. Described from Sweden. Type in London.

Economic importance. A noxious weed among crops and in vegetable gardens. Seeds contain 20—30% oil that is suitable for illumination.

2. **T. hueti** Boiss., Diagn. Sér. 2, No. 5 (1856) 39; Fl. Or. I (1867) 323; Suppl. 57; N. Busch in Fl. cauc. crit. III, 4 (1908) 159.

Annual, glabrous; stem 16—45 cm high, simple or branching; leaves eroded-dentate, the lower oblong, long-tapering, cauline leaves oblong, acute, with long obtuse auricles. Sepals 2—2.5 mm long; petals white, obovate-spatulate, clawed, 5—6 mm long; fruiting pedicels 12—18 mm long; silicles ca. 8—9 mm long and broad, orbicular, rather narrowly winged, shortly notched; style nearly as long as notch, 1.5—1.75 mm; cells 2—3-seeded; seeds 2—2.5 mm long, 1.5 mm broad. April—July. (Plate XXXIII, Figure 5).

Among weeds, roadsides and dry slopes. — Caucasus: W. and S. Transc. **Gen. distr.:** parts of Turkey adjacent to the Caucasus. Described from (Lesser) Armenia and Kurdistan (Tortum) from Huet's specimen. Type in Geneva.

Section 2. **NEUROTROPIS** DC., Syst. II (1821) 373, 377. — Silicle broad-winged, orbicular or obcordate, emarginate at apex. Wing girdled by a nerve. Seeds smooth.

3. **T. orbiculatum** Stev. in DC., Syst. II (1821) 377; Ldb., Fl. Ross. I, 163; N. Busch in Fl. cauc. crit. III, 4 (1908) 160.

582 Annual, glabrous; stem simple; leaves obovate, entire, radical leaves petioled, cauline leaves amplexicaul. Sepals white-margined; petals white, 2 mm long, slightly longer than sepals; fruiting pedicel 6—8 mm long; silicles orbicular, 11—17 mm across, with a large marginal nerve, wings radially nerved, apical notch narrow, closed, not deep, style equal to notch; cells 3—8-seeded. June. (Plate XXXIII, Figure 1).

Caucasus: W. Transc., 600—1,000 m. Endemic. Described from the Georgian SSR, from the Steven specimen. Type in Geneva.

4. **T. armenum** N. Busch in Fl. cauc. crit. III, 4 (1908) 160.

Annual, glabrous; stem tall, many-branched, branches 28—33 cm high; radical leaves petioled, ovate, cauline leaves ovate, ca. 4 cm long, 17—22 mm broad, entire, amplexicaul. Fruiting racemes dense, 11—16 cm long; fruiting pedicels 4—6 mm long; silicles orbicular, ca. 12 mm across, wings sharply radially veined, twice as broad as carpels, apical notch open, deep down to tip of cells; stigma sessile; cells 8—10-seeded; seeds rufous, 1.5—1.75 mm long, 0.75—1 mm broad.

Caucasus: S. Transc. Endemic. Described from Nakhichevan. Type in Leningrad.

583)

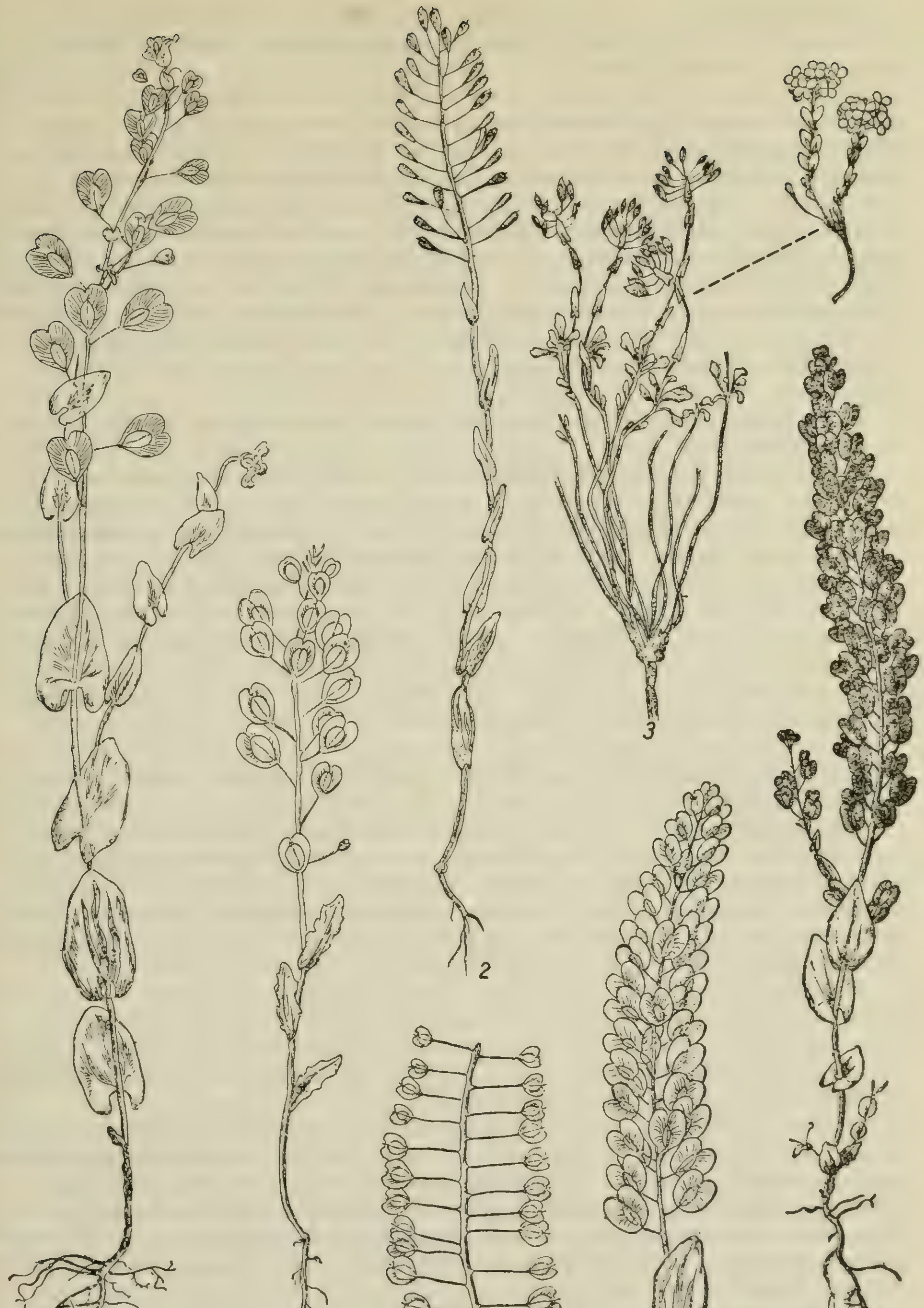

PLATE XXXIII. 1 – Thlaspi orbiculatum Stev.; 2 – T. freyni N.Busch; 3 – T. pumilum Ldb., with flowers and fruit; 4 – T. arvense L.; 5 – T. hueti Boiss.; 6 – T. perfoliatum L.; 7 – T. platycarpum F. et M.

5. **T. platycarpum** Fisch. et Mey., Ind. sem. VII Horti Petrop. (1840) 57; Boiss., Fl. Or. I (1867) 324; N. Busch in Acta Inst. Bot. Acad. Sc. URSS, Sér. 1, fasc. III (1936) 364.

Annual; stem branching or simple, 15—35 cm high; leaves entire, the lower petioled, cordate-ovate, cauline leaves ovate, amplexicaul. Sepals violet, very narrowly white-margined; petals white, 1.5 times longer than calyx; fruiting raceme elongating, 5—16 cm long, very dense; fruiting pedicels 5—13 mm long; silicles 9—10 mm long, 8—9 mm broad, obcordate, suborbicular, wings prominently nerved and obscurely netted-veined, broader than cells, cell with strongly prominent rib; 5—8-seeded, notch deep down apex of cells rather broad; style very short. June. (Plate XXXIII, Figure 7).

Subalpine zone. — Caucasus: S. Transc. **Gen. distr.**: As. Min. Described from Anatolia; occurs in the Caucasus in the Akh-Dag Mountain in the Nakhichevan ASSR. Type in Leningrad.

585 6. **T. kotschyanum** Boiss. et Hoh., Diagn. Ser. I, No. 8 (1849) 39; Boiss., Fl. Or. I (1867) 324.

Annual, glabrous, glaucous-green; stem 10—35 cm high, simple or branching; radical leaves petioled ovate, cauline leaves ovate, entire, amplexicaul, with orbicular auricles. Flowers minute; sepals lilac; petals white, oblong-linear, 1.5 times longer than sepals; fruiting raceme dense, 2—20 cm long; pedicels ascending-erect or spreading, ca. 4 mm long; silicles large, ca. 10 mm across, orbicular-obcordate, wings netted-veined, notch open, deep down to apex of cells; stigma sessile; cells 4—5-seeded. May.

Centr. Asia: T. Sh., Pam.-Al. **Gen. distr.**: Iran. Described from Iran (Elburz near Besh-Gala). Type in Geneva.

7. **T. szovitsianum** Boiss., Fl. Or. I (1867) 324; N. Busch in Fl. cauc. crit. III, 4 (1908) 161.

Annual, glabrous; stem simple, 20—55 cm high; radical leaves short-petioled, the rest sessile, amplexicaul, ovate, entire, 20—55 mm long, 9—30 mm wide. Raceme loose, few-flowered; petals white, 2.5—3 mm long, 1.5 times as long as calyx; silicles 10—11 mm long, 11—12 mm broad, oval-orbicular, slightly broader than long, wings netted-veined, apical notch open down to tip of cells; style very short; cells 4—6-seeded. June.

Caucasus: S. Transc. Endemic. Described from Karabakh. Type in Geneva.

8. **T. umbellatum** Stev. in DC., Syst. II (1821) 377; Ldb., Fl. Ross. I, 163; N. Busch in Fl. cauc. crit. III, 4 (1908) 161.

Annual, glabrous; 2—18—24 cm high, usually branching from base; leaves small, dentate, radical leaves petioled, ovate, cauline leaves elliptic, amplexicaul, auricled. Sepals 1—2 mm long; petals 2.5—3.5 mm long; fruiting raceme 1—20—45 cm long; silicles 4—7 mm long, 3.5—5.5 mm broad, obcordate, strongly tapering at base, segments angular, wings radially nerved, cells 4-seeded; stigma sessile; seeds rufous, 1.5—1.75 mm long, 0.75—1 mm broad. March—May.

Rocks, sandy slopes. — Caucasus: Dag., E. Transc., Tal. **Gen. distr.**: N. Iran. Described from Gilyan Province in Iran. Type in Geneva.

9. **T. perfoliatum** L., Sp. pl. (1853) 641; Ldb., Fl. Ross. I, 163; Shmal'g., Fl. I, 94; N. Busch in Fl. cauc. crit. III, 4 (1908) 163; Fl. Sib. et Or. Extr. (1913) 114; Kryl., Fl. Zap. Sib. VI, 1272. — Ic.: N. Busch, Fl. Sib. et Or. Extr. 114 et tab. geogr. 115.

Annual, glabrous, glaucous-green; stem 5—35 cm high, usually branching; radical leaves petioled, obovate, cauline leaves amplexicaul, large-auriculate, 586 oblong-ovate, all leaves entire, sometimes conspicuously remotely dentate (var. denticulatum N. Busch) or obscurely so. Sepals 1.25—1.75 mm long; petals 2.5—3 mm long, oblong; fruiting raceme 4—15 cm long; pedicels 6—8.5 mm long; silicles obcordate, 6—7 mm long, 4.5—6 mm broad; wings obscurely nerved, rounded at apex; style very short (stigma subsessile); cells 2—4-seeded; seeds brown, 1.25 mm long, 0.75 mm broad. April—July. (Plate XXXIII, Figure 6).

Stony slopes, rocks, roadsides, meadows, and among shrubs. — European part: U. Dnp., M. Dnp., Bl., V.-Don, L. Don, Crim.; Caucasus: entire Caucasus up to 1,400 m except Talysh; W. Siberia: Alt.; Centr. Asia: Ar.-Casp., Balkh., Kyz. K., Pam.-Al.; **Gen. distr.:** Scand., Atl. Eur., Centr. Eur., Med., Bal.-As. Min., Arm.-Kurd., Iran. Described from western Europe. Type in London.

Economic importance. T. perfoliatum, like T. arvense, is a noxious weed among crops and in vegetable gardens; in the spring it overgrows the young seedlings.

10. **T. annuum** C. Koch in Linnaea XV (1841) 258. — T. natolicum Boiss., Ann. Sc. Nat. (1842) 180; Fl. Or. I, 326; N. Busch in Fl. cauc. crit. II, 4 (1908) 166.

Annual, glabrous; stem 6—20 cm high, branching; radical leaves petiolate, entire or slightly dentate, ovate or elliptic, cauline leaves oblong, amplexicaul, auriculate. Sepals 1.5—2 mm long; petals white, 4—5 mm long; fruiting raceme loose, 3—6 cm long; silicles obcordate, 6—7 mm long, equally as broad, wings orbicular, obscurely nerved; style scarcely as long as notch; cells 4-seeded.

Caucasus: S. Transc. **Gen. distr.:** E. Med., Bal.-As. Min., Arm.-Kurd. Described from Borchalo, Lori, and from the Pambak Range in Armenia. Type in Berlin.

Section 3. **PTEROTROPIS** DC., Syst. II (1821) 373, 377. — Silicle winged, nearly obovate or triangular, notched or truncate at apex, without marginate nerves. Seeds smooth.

*11. **T. roseolum** N. Busch in Journ. botan. URSS 20 (1935) 83. — Ic.: N. Busch, l. c., 84.

Annual, completely glabrous, glaucous; stem branching; radical leaves oblong-obovate, petiolate, sparingly dentate, cauline leaves orbicular-ovate, subacute at apex, amplexicaul, minutely auricled at base. Sepals white or pink hyaline at margin, ca. 4 mm long; petals whitish pink, oblong-obovate, clawed, ca. 8 mm long, ca. 3 mm broad; fruiting pedicels 4—7 mm long, patulous or recurved; silicle obovate, narrowly winged; style 2 mm long; cells 4—7-seeded.

587 Growing only in Artvin District of Turkey. Possibly also occurring within the range of Transcaucasia. Described from Varttskhet Peak near Ardanuc in Artvin District. Type in Leningrad.

12. **T. cochleariforme** DC., Syst. II (1821) 381; Ldb., Fl. Ross. I (1842) 164; N. Busch, Fl. Sib. et Or. Extr. II (1913) 115; Kryl., Fl. Zap. Sib. VI (1931) 1272. — Ic.: N. Busch, l. c., 116 et tab. geogr. 117.

Perennial, glabrous with stems and reduced leafy shoots; stems simple, 5—30 cm high; leaves glaucescent, thick, ovate, entire, rarely obscurely dentate, radical leaves tapering into a petiole, cauline leaves sessile, more or less deeply cordate at base. Sepals 2.5—3 mm long; petals white, 6—7.5 mm and 5—6.5 mm long [?], obovate, unequal; one pair a little longer than the other; fruiting pedicels 5—10 mm long; silicles obovate-cuneate, 5—9.5 mm long, 2.5—4 mm broad in upper part, somewhat emarginate at apex, wings narrow, slightly broadening in upper part; style 1—2.25 mm long; cells usually 4-seeded; seeds yellowish brown, 1.75 mm long, 1.25 mm broad. May—July.

Alpine meadows, stony slopes and steppes. — European part: V.-Kama (Urals, Kyshtymskii plant); W. Siberia: Alt.; E. Siberia: Ang.-Say., Dau.; Centr. Asia: Dzu.-Tarb., T. Sh. Described from Patrin's specimen from Dauria. Type in Geneva.

13. **T. exauriculatum** Kom. in Fedde, Repert. sp. 9 (1910—1911) 392 in Semyag., Sakhal. (1911) 19, 27; N. Busch, Fl. Sib. et Or. Extr. I (1913) 118. — Ic.: Semyag., l. c.; N. Busch, l. c., 118 et tab. geogr. 117.

Perennial, glabrous, cespitose; stems numerous, erect or ascending; radical leaves numerous, long-petiolate, obovate, rounded at apex, cuneate at base, petioles flat; cauline leaves sessile, minute, oblong, rounded at apex, thickish, somewhat tapering at base, exauriculate, with one midrib. Fruiting racemes elongating; fruiting pedicels 3—3.5 mm long; silicle cuneate at base, obovate, 6—6.5 mm long, 2 mm broad, borne on very short gynophore; style 1.25—1.5 mm long, seeds oblong, grayish brown, marginate, 1—2 in cell. Fr. July.

Stony places among Japanese stone pine (Pinus pumila Rgl.) — Far East: Sakh. Endemic. Described from the northern part of Sakhalin. Type in Leningrad.

14. **T. praecox** Wulf. in Jacq., Coll. II (1788) 124, tab. 9; Shmal'g., Fl. I, 95; N. Busch in Fl. cauc. crit. III, 4 (1908) 167.

Perennial, glabrous, glaucous, many-stemmed from base; stems erect, simple, 8—28 cm high; leaves thickish, entire or slightly dentate, radical
588 leaves petiolate, often reddish, oblong or orbicular, cauline leaves oblong, amplexicaul, auriculate. Sepals reddish, 2—2.5 mm long; petals white, obovate-oblong, ca. 3—5 mm long; anthers scarcely exceeding calyx; silicles 5—6 mm long, triangular-obcordate, margined at apex with a wing as broad as cell, tapering at base and with a barely visible wing; style slightly exceeding notch; cells 4-seeded. March—May.

Steppes and the Yaila plateau. — European part: M. Dnp., Bl., Crim. **Gen. distr.:** Centr. Eur., Med., Bal.-As. Min. Described from Europe. Type in Paris.

15. **T. freyni** N. Busch in Fl. cauc. crit. III, 4 (1908) 171; in Journ. Bot. URSS 20 (1935) 83. — T. stenopterum Conr. et Fr. in Bull. Herb. Boiss. III (1895) No. 1, p. 38—39, non Boiss. et Reut. (1849). — Carpoceras longistyla Sosn. in Monit. Jard. Bot. Tiflis Nouv. Sér., Livrais. I (1922—1923) 77.

Perennial, completely glabrous, glaucescent-green; stem simple, radical leaves petiolate, obovate-spatulate, sparingly undulate at margin, cauline leaves sessile, oblong, subacute, amplexicaul at base, obtusely auricled, slightly undulate or eroded-subdentate to subentire. Flowering raceme short, subcorymbose, elongating in fruit; pedicels ca. 8 mm long; sepals 1.75—2.5 mm long; petals white, 5—7 mm long, ca. 1.5—2 mm broad, short-clawed, blade obovate-oblong; anthers yellow; silicle obovate-oblong, hornless, 7—8 mm long, netted-veined; style 1.75—2 mm long; cells 3—4—6-seeded. May. (Plate XXXIII, Figure 2).

Alpine zone, 2,200—2,600 m. — Caucasus: S. Transc. Endemic. Described from Lyalvar and Lok mountains in Armenia. Type in Leningrad.

16. **T. macranthum** N. Busch in Acta H. Jurjev. VII (1906) 142; in Fl. cauc. crit. III, 4 (1908) 168. — T. montanum Ldb., Fl. Ross. I (1842) 164 (part.). — Ic.: N. Busch in A. H. J., l. c. — Exs.. Fl. Cauc. Exs. No. 90.

Perennial, glabrous, glaucous, many-stemmed from the very base; leaves usually entire, rarely denticulate, radical leaves obovate-elliptic or orbicular-ovate, petiolate, cauline leaves ovate-elliptic or ovate-lanceolate, all leaves amplexicaul, auriculate. Raceme elongate, many-flowered; petals 6—6.5 mm long; stamens 1.5 times as long as calyx; anthers yellow; pedicels nearly as long as flowers; silicles netted-veined, obovate-cuneate-oblong, tapering at base, emarginate at apex, 7—10 mm long; style as long as the breadth of silicle; cells 2—4—6-seeded. March—June.

589 Forest meadows, forest edges, and in mountainous open stony places. — European part: Crim.; Caucasus: W. Transc. (Novorossiisk, Tonnelnaya). Endemic. Described from Novorossiisk and Tonnelnaya. Type in Leningrad.

17. **T. ferganense** N. Busch in Journ. Botan. URSS 21 (1936) No. 5, p. 551.

Perennial, glabrous; root slender, with stems but without shoots; stems solitary, rarely 2, simple, up to 40—50 cm high and even taller; leaves glaucescent or glaucous, broadly ovate, entire, radical leaves tapering into a petiole, cauline leaves sessile, more or less deeply cordate at base. Sepals 2.5—3.5 mm long; petals white, 6.5—7.5 mm long, obovate; fruiting pedicels 10—15 mm long; silicles oblanceolate-cuneate, 10—13 mm long, ca. 3 mm broad above, slightly emarginate at apex, wings narrow, slightly broadened above; style 1 mm long; cells 4—5-seeded, yellowish brown. May—June.

Occurs at 2,700—2,800 m. Centr. Asia: Pam.-Al., T. Sh. Endemic. Description based on specimen from canyon slopes near Ak Bazog in the Fergana Region, found in juniper forests by Alekseenko, and on many other specimens from Fergana collected by Korzhinskii, A. Regel, Lipsky. Type in Leningrad.

Section 4. **APTERYGIUM** Ldb., Fl. Ross. I (1824) 164. — Silicle wingless, valves keeled. Seeds smooth.

18. **T. pumilum** Ldb., Fl. Ross. I (1842) 164; N. Busch in Fl. cauc. crit. III, 4 (1908) 171.

Perennial, glabrous; thin-filiform, leafless shoots developed from summit of root; stems 2.5–6 cm high, leafy; leaves small, thickish, entire or rarely crenate, radical leaves petiolate, ovate, cauline leaves oblong, amplexicaul, acutely auricled. Sepals reddish, 2.5–2.75 mm long; petals white, 6–8 mm long; fruiting raceme umbelliform; silicles tapering at both ends, elliptic, 6–8 mm long, ca. 3.5 mm broad; style 1–2 mm long, filiform, exserted from notch; cells 2-seeded. June–August. (Plate XXXIII, Figure 3).

Taluses of the upper alpine zone, from 2,300–3,400 m. — Caucasus: central and eastern Greater Caucasus. Endemic. Described from the vicinity of Elbrus. Type in Leningrad.

Note. A rare species. The high-mountain section Apterygium was developed for the most part in the glacial period. Nearly all its species are common to the alpine zone of the mountains of Central Europe, the Balkan Peninsula, Asia Minor, and the Caucasus.

19. **T. rostratum** N. Busch in Monit. Jard. Tiflis. Sér. III, livr. 3 (1927) 10, cum icone.

Undershrub, completely glabrous, many-stemmed; stems small, 5–10 cm high, leafy; rosetted leaves spatulate, slightly dentate, tapering into a petiole,
590 cauline leaves obovate, sessile. Sepals ca. 3.8 mm long; petals oblong, pink, 6.5 mm long, 2.3 mm broad; stamens ca. 3 mm long; lateral nectariferous glands crescent-shaped at both sides of base of the shorter stamens, with arcuate appendages directed toward the median line; fruiting raceme short; fruiting pedicels ca. 3 mm long; silicles oblong, tapering at both ends, 9–18 mm long, 4–5 mm broad; style long, ca. 5 mm; septum nerveless and without a median strand, epidermal cells with thin parallel walls; seeds rufous-brown, 2–2.5 mm long, 0.8–1 mm broad. Fr. June.

Caucasus: S. Transc. (Ordubad). Endemic? Described from Ordubad (Nakhichevan ASSR). Type in Leningrad.

Note. Very peculiar ancient species.

Genus 683. **EUNOMIA** * DC.**

DC., Syst. II (1821) 555; N. Busch in Fl. cauc. crit. III, 4 (1908) 141; Hayek, Crucif.-Syst. (1911) 298.

Sepals hardly saccate. Petals entire, nearly always pink, rarely white. Filaments free, edenticulate. Silicle bilocular, nearly wingless, elliptic, oblong-elliptic or oval, tapering or slightly emarginate at apex, valves carinate, sometimes keeled at summit, netted-veined. Cells 1–2-seeded. Ovules pendulous. Cotyledons flat, embryo notorrhizal. A crescent-shaped nectariferous gland at both sides of the shorter stamens with a long appendage directed toward the median stamens. — Dwarf, glabrous, cespitose perennials, with creeping stolons.

An East Mediterranean high-mountain genus of 5 species; one is common to the Soviet Union.

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* From the Greek eunomia — accuracy, order.

** Treatment by N.A. Bush.

1. **E. rotundifolia** C. A. M., Verz. d. Pflz. Cauc. (1831) 194; N. Busch in Fl. cauc. crit. III, 4 (1908) 142. — Aethionema rotundifolium Boiss., Fl. Or. I (1867) 344; Suppl. 60.

Perennial; stems 3—15 cm high; leaves opposite, orbicular-oval, obovate or orbicular, sessile, entire, smooth at margin, 6—20 mm long, 4—12 mm broad. Sepals reddish, 4—4.5 mm long; petals pink or light pink, 8—10 mm long; silicles oval-oblong, ca. 8 mm long, ca. 3—4 mm broad, emarginate; style prominent, ca. 1 mm long; funicles free at base. June—August. (Plate XXXIII, Figure 5).

591 Taluses of the upper alpine zone, 2,000—3,400 m. — Caucasus: Alps of Greater and Lesser Caucasus. Endemic. Described from the alpine zone of Elbrus, 2,600 m. Type in Leningrad.

Note. E. oppositifolia DC., reported from Sevan by Lipsky in Fl. Kavkaza 232, does not grow there; it does not occur at all within the Soviet Union.

Economic importance. An ornamental plant.

Genus 684. **CARPOCERAS** * BOISS.**

Boiss., Diagn. No. 8 (1849) 36; N. Busch in Fl. cauc. crit. III, 4 (1908) 172; Thlaspidis generis sect. Carpoceras DC., Syst. II (1821) 374.

Sepals divergent, not saccate. Petals white, rarely pink, entire. Filaments free, edenticulate. Silicle laterally compressed, obtriangular, with 2 acute horns at apex and a broad, crescent-shaped notch, valves carinate, wingless. Seeds 2 in each cell, concentrically sulcate. Septum with cells divided perpendicularly to its length. Embryo obliquely pleurorhizal. — Glabrous annuals, biennials, or perennials, with entire and eroded leaves, cauline leaves amplexicaul, obtusely or acutely auricled.

A genus common to western Asia; of its 7 species 3 are encountered in the USSR.

1. Petals light pink. Silicles 3-lobed at apex; two horns and exserted base of style . . . . 1. **C. hastulatum** (Stev.) Boiss.
+ Petals white. Silicles 2-horned (2-lobed) at apex . . . . 2.
2. Horns nearly as long as silicles; leaves with acute divergent auricles (hastate). Siberia and Central Asia . . . . 2. **C. ceratocarpum** (Pall.) N. Busch.
+ Horns distinctly shorter than silicle. Leaf with auricles not as above . . . . 3.
3. Horns short, not divergent. Style inconspicuous. Leaf with subacute auricles (Transcaucasia) . . . . 3. **C. brevistylum** N. Busch.
+ Horns long, divergent. Style ca. 1 mm long. Auricles obsolete, obtuse (Kopet Dagh) . . . . 4. **C. stenocarpum** Boiss.

1. **C. hastulatum** (Stev.) Boiss., Diagn. Sér. I, No. 8 (1849) 38; Fl. Or. I (1867) 333; N. Busch in Fl. cauc. crit. III, 4 (1908) 173. — Thlaspi hastulatum Stev. in DC., Syst. II (1821) 388; Ldb., Fl. Ross. I (1842) 162. — Hutchinsia hastulata DC., l. c.

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* From the Greek carpos — fruit, and keras — horned.

** Treatment by N.A. Bush.

592 Annual, branching from base; stem 30–50 cm high; radical leaves short-petioled, small, ovate, cauline leaves eroded, oblong-linear, 10–18 mm long, 2.5–4 mm broad, acute, auricles short, divergent. Sepals ca. 2 mm long; petals light pink, ca. 6 mm long; silicles 7–8 mm long, 2–3 mm broad, elongate, linear-obtriangular, 3-lobed at apex with exserted base of style; horns short, triangular, strongly divergent; style ca. 1 mm long. August. (Plate XXXII, Figure 3).

Sandy and stony places. From 1,400 to 2,000 m. – Caucasus: Tal. **Gen. distr.:** Iran. Described from Girkaniya (Talysh). Type in Geneva.

2. **C. ceratocarpum** (Pall.) N. Busch in Fl. Sib. et Or. Extr. I (1913) 119; Kryl., Fl. Zap. Sib. VI, 1273. – C. sibiricum Boiss., Diagn. 8 (1849) 36. – Lepidium ceratocarpum Pall., Reise II (1773) Anhang 740, No. 112, tab. U. – Thlaspi ceratocarpon Murr., Comm. Goett. V (1774) 26. – T. ceratocarpum Ldb., Fl. Ross. I (1842) 162.

Annual; radical leaves obovate, short-petioled, cauline leaves oblong-lanceolate, with acute hastate auricles at base, subamplexicaul. Flowers small; petals 1.5 times as long as calyx; silicle short, horns triangular, as long as or shorter than silicle; stigma sessile; seeds with arcuate furrows. May.

W. Siberia: U. Tob., Irt., Alt.; Centr. Asia: Balkh. **Gen. distr.:** Turkey (eastern), Mong. (northern). Described from the Irtysh River and the Dzungarian semidesert. Type in London.

3. **C. brevistylum** N. Busch in Journ. Bot. URSS (1935) No. 1, p. 82.

Annual; stem simple, leafy above; all leaves ovate, radical leaves rosetted, petiolate, cauline leaves amplexicaul at base, acutely auricled. Sepals white-margined, ca. 2 mm long; petals white, obovate, ca. 4 mm long, ca. 2.5 mm broad; fruiting pedicels ca. 9 mm long; silicle 2-horned, markedly shorter than silicle; style very short. June. (Plate XXXII, Figure 1).

Caucasus: S. Transc. (Sevan). Endemic. Described from Sevan Lake, Malchishka Mountain near Akhta. Type in Leningrad.

4. **C. stenocarpum** Boiss., Diagn. Sér. I, No. 8 (1849) 38; Fl. Or. I, 331.

Annual, many-stemmed; 20–30 cm high; radical leaves petiolate, ovate, cauline leaves oblong, amplexicaul, with short obtuse auricles, slightly eroded. Sepals white-margined, oblong, 2.5 mm long; petals 4.5–5 mm long, oblong, narrowly spatulate, white; fruiting pedicels 3.5–5 mm, ascending-
593 erect or subhorizontal; silicles linear-obtriangular, with divergent horns, 10–12 mm long (including horns); style distinctly shorter than notch, 1 mm long; cells 8–10-seeded. May–June. (Plate XXXII, Figure 2).

High-mountain zone. – Centr. Asia: Mtn. Turkm. (Kopet Dagh). **Gen. distr.:** Iran (northern). Described from the high-mountain zone of Iran (Tochal and Elburz). Type in Geneva.

Genus 685. **TEESDALIA** * R. BR.**

R.Br.in Ait.Hort.Kew.ed.2, IV (1812) 83.

Sepals divergent. Petals small, white, with obsolete claws, the outer often enlarged. Filaments free, with squamiform appendage at base, lateral stamens often absent. A pyramidal nectariferous gland at both sides of the shorter stamens, very small, often absent. Ovary sessile, style very short, stigma 2-lobed. Silicle orbicular-cordate, flattened at sides, more convex at outer side than inner, emarginate and narrowly winged at apex, valves carinate. Cells with 2 pendulous seeds. Cotyledons flat, embryo pleurorhizal. Hairs absent. — Annuals or biennials, with pinnate radical rosetted leaves.

Genus of 2 species — one distributed in Europe, the other in the Balkan Peninsula and Asia Minor; the European species is encountered in the Soviet Union.

1. **T. nudicaulis** (L.) R. Br. in Ait. Hort. Kew. ed. 2 (1812) 83; Shmal'g., Fl. I (1895) 94. — Iberis nudicaulis L., Sp. pl. (1753) 650. — Ic.: Schulz in E.-Pr., Nat. Pflzf. 17b (1936) 448, fig. 270.

Annual, small; stem 8—10 cm long; leaves rosetted, lyrate-dissected, with obtuse unpaired lobes; floriferous branches usually several, leafless or furnished with 1—2 small, sublinear leaves. Petals unequal, white, 1.5—3.5 mm long; silicles borne on equally long horizontal pedicels, 3—3.5 mm long. Spring.

Sandy places and fields, rare. — European part: U. Dnp., M. Dnp. **Gen. distr.:** nearly all Europe. Described from Europe. Type in London.

Genus 686. **HELDREICHIA** † BOISS.**

Boiss. in Ann.Sc.nat.Bot.2, sér.XVI (1841) 3816; Hayek, Crucif.-Syst.(1911) 301; Schulz in Engl.-Pr., Nat.Pflanzf.2-te Aufl., B.17b (1936) 434.

Sepals divergent, not saccate. Petals with obsolete claws, white or pink. Stamens free, filaments of longer stamens winglike, dilated at base, 594 denticulate. A crescent-shaped nectariferous gland at both sides of the shorter stamens coalescing at the inner side and with a long appendage toward the longer stamens. Ovary sessile, style short, stigma emarginate. Silicle laterally flattened, broadly oblanceolate or oblate, with acutely carinate valves and narrow septum, cells with 1 pendulous seed. One cell often not developed, then fruit 1-seeded. Septum with numerous cells and bundle of fibers. Cotyledons flat, embryo pleurorhizal. Glabrous, branching, glaucescent plants, often with strongly branching rhizome, with rosette or radical leaves and small cauline leaves sessile or short petioled.

A genus of 6 species distributed from Asia Minor to Afghanistan; only one occurs in the Soviet Union.

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* After the English botanist, R. Teesdale.

** Treatment by N.A. Bush.

† After Heinrich Herman Heldreich, specialist on the flora of Greece.

1. **H. longifolia** Boiss. in Ann. Sc. Nat. (1842) 184; Fl. Or. I (1867) 319; O. et B. Fedtsch., Consp. Fl. Turk. I (1906) 83.

Shrub; rhizome stout, multicipital, covered above with decayed leaves; stems several, thin, rod-shaped, 40–150 cm high, stems and leaves glaucescent, divaricately branching (at nearly a right angle), branches thin; radical leaves linear-lanceolate, long, rather long-petioled, subacute; cauline leaves narrowly linear, small. Racemes short, few-flowered; sepals ca. 1.75 mm long, oval-orbicular, puberulent outside; petals white, orbicular, clawed, ca. 4 mm long; fruiting pedicels 5–10 mm long, thin, ascending-erect; silicles glabrous, oval-orbicular or obovate, 6 mm long, 4 mm broad, style nearly absent, stigma small, punctiform; seeds olive-green, with small grayish brown appendage at apex, up to 3 mm long, ca. 1.5 mm broad. From April throughout the summer.

Rocks, stony places, juniper thickets (Junipereta). — Centr. Asia: Mtn. Turkm., Pam.-Al. **Gen. distr.:** Iran. Described from southern Iran. Type in Geneva.

Genus 687. **PELTARIA** * JACQ.**

Jacq., Enum. stirp. Vindob. (1762) 117; N. Busch in Fl. cauc. crit. III, 4 (1908) 178; Hayek, Crucif.-Syst. (1911) 302.

Sepals divergent. Petals short-clawed, white. Filament simple, free. A crescent-shaped nectariferous gland at both sides of the shorter stamens with a short appendage directed outward; glands often connate in pairs at the inner side. Ovary sessile. Style null. Fruit indehiscent, lentiform, 595 flattened, tapering at base, aseptate, netted-veined, 1-seeded. Seeds flattened. Cotyledons flat. Embryo pleurorhizal. Hairs simple. — Perennials, with glabrous leaves, paniculate inflorescence, and pendulous fruit.

An East Mediterranean and Near Asian genus of 5 species, one of which occurs in the USSR.

1. Petals 7–7.5 mm long. Silicles suborbicular, ca. 9.5 mm long, ca. 8.5 mm broad. Cauline leaves oblong-obovate . . . . * 3. **P. voronovii** N. Busch.
+ Petals 4.5–6 mm long. Silicles obovate, 13–18 mm long, 8–10 mm broad . . . . 2.
2. Cauline leaves linear, radical leaves oblong-elliptic . . . . * 2. **P. aucheri** Boiss.
+ Cauline leaves oblong-obovate, radical leaves broadly-obovate . . . . 1. **P. turkmena** Lipsky.

1. **P. turkmena** Lipsky in Mat. Fl. Sredn. Azii (1900) 8.

Shrub, 50–70 cm high; stem leafy; lower leaves large, oblong-ovate, entire or remotely crenate-dentate, long-petioled, cauline leaves short-petioled, the upper sessile, ovate-lanceolate, sparingly dentate, the uppermost leaves sometimes linear. Inflorescence branching; sepals ovate, white-margined, ca. 2.5 mm long; petals white, obovate, tapering at base into a short claw, ca. 6 mm long; pedicels very thin, filiform, arcuately curved, 5–15 mm long; silicles flattened, obovate, slightly oblique, finely netted-veined, pendulous, 13–18 mm long, 8–10 mm broad; seeds 1, flattened. April–May.

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* From the Greek pelta — shield.

** Treatment by N.A. Bush.

Stony and grassy slopes in lower mountain zone. — Centr. Asia: Mtn. Turkm. Endemic. Described from Ashkhabad, Germab, Khodzhakala, and Bami. Type in Leningrad.

★2. **P. aucheri** Boiss. in Ann. Sc. Nat. Sér. II, XVII (1842) 175; Fl. Or. I (1867) 308; N. Busch in Fl. cauc. crit. III, 4 (1908) 179.

Shrub; stems often procumbent, 20–50 cm long; leaves thickish, glaucescent, subsessile, the lowermost oblong-elliptic, ca. 7.5 mm broad, median leaves oblong-linear, ca. 5 mm broad, the uppermost linear, 1.5–2.5 mm broad. Sepals 2.5 mm long; petals 4.5–5 mm long, pink; fruiting racemes rather loose; silicles obovate, tapering at base, 13–14 mm long, 10 mm broad; seeds flattened. May.

Taluses. — **Gen. distr.:** Arm.-Kurd. Described from Turkish Armenia. Type in Geneva.

Note. Reported in the event it is found within the range of Transcaucasia.

596 ★3. **P. voronovii** N. Busch in Fl. cauc. crit. III, 4 (1908) 179.

Shrub; stem 20–25 cm high; leaves thickish, glaucescent, subsessile, the lowermost broadly obovate, 13–18 mm broad, median leaves oblong-obovate, 7–9 mm broad, the uppermost oblong, 3–5 mm broad. Sepals 2.5 mm long; petals 7–7.5 mm long, pink; silicles suborbicular, 9.5 mm long, 8.5 mm broad; seeds flattened. May–June.

Gravels. — **Gen. distr.:** Arm.-Kurd. (Artvin). Described from Artvin District, from a dried-up riverbed near Zakariet (Shavshetiya). Type in Leningrad.

Note. Reported in the event it is found within the Soviet Union.

Genus 688. **CAMELINA** * CRANTZ**

Crantz, Stirpium Austr.fasc. I (1762) 17.

Sepals erect, not saccate. Petals clawed, yellow. Filament free, edenticulate. An inflated nectariferous gland at both sides of the shorter stamens, sometimes connate in pairs at the outside. Ovary sessile, style elongate, stigma obtuse. Fruit an oblanceolate or pyriform, 2-valved silicle, valves strongly convex with distinct midrib, thin-walled. Epidermal cells of septum polygonal, with undulate thickened walls. Cells many-seeded. Seeds oval, cotyledons flat, embryo notorrhizal. Hairs branching and simple. — Winter or spring annuals, with sagittate cauline leaves.

Economic importance. Camelina Crantz is considered an oil-plant and is cultivated in some areas for the oil extracted from the seeds, which is used in food.

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* From the Greek khamai – low, and linon – flax, i.e., a plant suppressing flax, not allowing it to grow.

** Treatment by I.T. Vasil'chenko.

Of the cultivated species, the following are encountered in the USSR: spring C. glabrata, winter C. pilosa and the Caucasian C. caucasica (spring).

1. Fruit 7—12 mm long . . . . 2.
+ Fruit 4—7 mm long . . . . 5.
2. Plant yellowish green, glabrous, subramose. Leaves sparse or few. Fruit 9—12 mm long, seeds 2—3 mm long. (Northwestern region of the European part of the USSR) . . . . 7. **C. linicola** Sch. et Sp.
+ Plants green, usually pubescent, densely leafy and branching . . . . . 3.
3. Plant profusely branching almost from base, with long ascending branches. Fruit elongate, 9—10 mm long, 4—5 mm broad, with slender,
597 laterally concave valves. Transcaucasia . . . . 8. **C. caucasica** (Sinsk.) Vass.
+ Fruit not as elongated, valves coarser . . . . 4.
4. Plant densely covered with spreading simple and finely branched hairs. Leaves many, crowded. Fruit oblong-pyriform, coarse, borne on thickened pedicels. Seeds 1.2—1.8 mm long. Winter plant . . . . 5. **C. pilosa** (DC.) N. Zing.
+ Plant covered with finely branched hairs. Leaves fewer and more loose. Fruit oblanceolate, on thin pedicels. Seeds 1.5—2(2.5) mm long . . . . 6. **C. glabrata** (DC.) Fritsch ex N. Zing.
5. Petals orange-yellow. Raceme long, with a geniculate-flexuous, somewhat jointed axis . . . . 1. **C. laxa** C. A. M.
+ Petals white or whitish yellow. Raceme axis straight . . . . 6.
6. Petals white, 6—7 mm long, 1—1.5 mm broad, twice as long as sepals . . . . 2. **C. albiflora** Kotschy et Boiss.
+ Petals whitish yellow, 3—4(5) mm long, 1.5(2) times as long as sepals, ca. 1 mm broad . . . . 7.
7. Fruit elongate, small, 4—6 mm long and 2.5—3 mm broad, many, usually congested in raceme, easily dehiscing . . . . . . 4. **C. microcarpa** Andrz.
+ Fruit larger and not as elongate, 5—7(8) mm long, 3.5—4(5) mm broad, not congested in the raceme; valves not dehiscing as easily as preceding species . . . . 3. **C. silvestris** Wallr.

1. **C. laxa** C. A. M., Verz. Pfl. Cauc. (1831) 193; Ldb., Fl. Ross. I (1842) 197; N. Busch, Fl. cauc. crit. III, 4 (1909) 393.— Exs.: HFR, No. 2512.

Annual, 20—80 cm high, profusely branching; covered beneath with simple and finely branched divergent hairs, glabrescent above; radical leaves usually sinuate-dentate, oblong, gradually tapering at base into a broad petiole, cauline leaves lanceolate, gradually reduced above, becoming linear-lanceolate, sessile. Racemes long with axis jointed-geniculate and flexuous; sepals oblong, greenish yellow, glabrescent, 2—5 mm long; petals oblong-obovate, ca. 5—6 mm long, orange-yellow; fruiting pedicels thin, clavate-thickened at apex, 10—20 mm long, subhorizontally patent; fruit orbicular-oblanceolate, 4—6 long, 3—3.5 mm broad, with a 1.5—2.5(3) mm long style and smooth valves; seeds reddish brown, ca. 1—1.25 mm long. Winter annual, flowering from April.

598 Mountain slopes (up to 2,500 m), stony places, steppes, sometimes as a weed.— Caucasus: S. and E. Transc., Tal. **Gen. distr.:** Iran., Arm.-Kurd., Bal.-As. Min. Described from Transcaucasia (Talysh). Type in Leningrad.

2. **C. albiflora** Kotschy in Boiss., Fl. Or. I (1867) 312; N. Busch in Fl. cauc. crit. III, 4 (1909) 391.— C. sylvestris Wallr. β albiflora Boiss., l. c.— C. rumelica Velen., Fl. Bulgar. (1891) 43.— Exs.: HFR, No. 1956.

Annual, 15—65 cm high, covered below with rigid spreading hairs, mostly simple, branching, glabrescent above; stem simple or slightly branching; lower leaves large, oblong, usually dentate, cauline leaves lanceolate (the upper small, linear-lanceolate), subentire (or slightly dentate), few, remote. Sepals oblong, 2.5—3.5 mm long; petals linear-spatulate, dilated and rounded above, 6—7 long, 1—1.5 mm broad, white (sometimes yellowish); fruit usually few, pyriform, gradually tapering at base, 5—7 long, 3—4 mm broad, in loose raceme; pedicels ascending, thickened, 10—20 mm long; fruit valves nearly smooth (median longitudinal rib often visible only in lower part of valves), broad and flat at margin; style ca. 1.8—2 mm long; seeds ca. 1.5 mm long. Winter annual. March—April.

Stony slopes, steppes, sometimes as a weed.— European part: Crim., Bl.; Caucasus: S. and E. Transc.; Centr. Asia: Mtn. Turkm., Syr D., Pam.-Al. **Gen. distr.:** Bal.-As. Min., Med., Arm.-Kurd., Iran. Described from Asia Minor by Boissier, in more detail by Velenovskii from the Balkan Peninsula (Bulgaria). Type in Geneva.

3. **C. silvestris** Wallr., Schedul. crit. de plantis fl. Halensis selectis (1822) sensu stricto!— C. silvestris ssp. microcarpa var. major Sinskaja, Tr. prikl. bot., gen. i sel. 2, XIX (1928) 537.— C. microcarpa auct. pl. p. p., non Andrz.— Ic.: Sinskaja, l. c.

Annual, grayish green plant, 20—60 cm high, covered with simple and finely branched spreading hairs; stem simple or few-branched, rigid, indurate; radical leaves oblong or oblong-obovate, petioled, cauline leaves lanceolate, sessile, sagittate at base, with relatively long auricles, usually many. Sepals oblong-lanceolate, 2—2.5 mm long; petals linear, narrow, whitish yellow, 3—4(5) mm long; fruit in more or less loose racemes, short-pyriform or suborbicular, 5—7(8) long, 3.5—4.5(5) mm broad, valves coarse, broad and flat at margin, with a longitudinal thin rib in the middle; fruiting pedicels coarse, thickened, 5—10(15) mm long, ascending or sub-
599 horizontally declinate; style 1.5—2 mm long; seeds reddish brown, 1.2—1.5 mm long; valves dehiscing at maturity with more difficulty than in C. microcarpa Andrz. Winter annual. March—April.

Steppes, stony slopes, and as a weed in fields. Mountainous areas up to 2,000 m.— European part: Bl., L. Don, L. V.; Caucasus: all regions; Centr. Asia: Balkh., Mtn. Turkm., T. Sh., Syr D., Amu D., Pam.-Al. **Gen. distr.:** Dzu.-Kash., Iran., Bal.-As. Min., Scand., Centr. Eur., Atl. Eur. Described from Central Europe.

Note. C. longistyla Roop in herb. nom. nud., whose style is up to 3 mm in length, apparently belongs here. Because of lack of material we are not able to solve this problem at this time.

4. **C. microcarpa** Andrz. in DC., Syst. nat. II (1821) 517 et Prodr. I (1824) 201, sensu stricto; N. Busch, Fl. cauc. crit. III, 4 (1909) 389; Fl. Sib. et Or. Extr. III (1919) 286.— C. silvestris subsp. microcarpa N. Zinger in Tr. Bot. Muz. Akad. Nauk VI (1909) 23 p. p.— C. silvestris subsp. microcarpa var. minor Sinskaja, in Tr. prikl. bot., gen. i sel. 3, XIX (1928) 537.— C. microcarpa auct. fl. ross. p. p.— Ic.: N. Zinger, l. c., N. Busch Fl. Sib. et Or. Extr. 288 et tab. geogr. 289; Sinsk., l. c.— Exs.: HFR No. 1504.

Annual, 40—80(100) cm high, with rather stout stem branching from the middle or nearly from base, branches long, ascending (rarely stem simple), covered with simple and finely branched spreading hairs, glabrescent above; leaves usually numerous, the lowermost oblong-obovate, cauline leaves lanceolate (the upper linear-lanceolate), usually appressed to stem, sessile, sagittate at base, long-auricled. Flowers in long racemes, small; sepals oblong-lanceolate, 1.8—2 mm long; petals yellowish, linear, 2.5—3 mm broad; fruits numerous, elongate-pyriform, 4—6 mm long, 2.5—3 mm broad; valves smooth (longitudinal midrib none or visible only in the lower part, narrowly marginate, thin readily dehiscing at maturity; style ca. 1—1.5(1.8) mm long; fruiting pedicels ascending, 1015(20) mm long, thin; seeds 0.8—1.2 mm long; May—June.

Steppes, slopes, shores of rivers and lakes and as a weed in fields. — European part: Kar.-Lap., Lad.—Ilm., Dv.-Pech., U. Dnp., U. V., V.-Kama, M. Dnp., V.-Don, Transv., Bl., L. Don; Caucasus: Cisc., Transc. (mountainous part); West Siberia: U. Tob., Irt., Alt., Ob; East Siberia: Ang.-Say., Dau., Lena-Kol., Yenis.; Centr. Asia: Ar.-Casp., Dzu.-Tarb. **Gen. distr.:** Scand., Centr. Eur. Described from Podolia. Type in Besser's Herbarium in Kiev.

Note. In the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR, there are plants collected in Transbaikalia which refer to the preceding species; they are distinguished by exceedingly
600 elongated fruit, 6—7 mm long, 2.5—3 mm broad. I refer these plants to C. microcarpa Andrz. var. transbaicalensis Vass. = C. transbaicalensis Vass.? Collection of more material of the Transbaikalia variety of C. microcarpa would be very desirable.

5. **C. pilosa** N. Zinger in Tr. Bot. Muz. Akad. Nauk VI (1909) 23. — C. satica var. pilosa DC., Prodr. I (1824) 201; N. Busch, Fl. cauc. crit. III, 4 (1909) 387.

Annual, 50—70(100) cm high, with stout, coarse, branching, markedly leafy stem, densely covered with spreading, simple and finely branched hairs; leaves large, numerous, often overlapping each other, lower leaves oblong, petioled, cauline leaves lanceolate, sessile, sagittate at base. Sepals oblong, ca. 2.5 mm long; petals linear-spatulate, ca. 5 mm long; fruit elongate-pyriform, often subovate, 8—12 mm long, 4.5—6 mm broad; valves coarse, darkish, finely netted-veined, and with a thin longitudinal midrib; fruiting pedicels thickened, ca. 10—20 mm long; style 1—1.5 mm long; seeds reddish brown, 1.2—1.8 long, ca. 1 mm broad. April—June.

Weed in winter crops; cultivated in some places. A winter annual. — European part: all regions; Caucasus: all regions. **Gen. distr.:** W. Eur. Described from western Europe.

6. **C. glabrata** (DC.) Fritsch ex N. Zinger in Tr. Bot. Muz. Akad. Nauk VI (1909) 23; N. Busch in Fl. Sib. et Or. Extr. III (1919) 283. — C. sativa var. glabrata DC., Prodr. I (1824) 201; Sinskaya, Tr. prikl. bot., gen. i sel. 3, XIX (1928) 543; N. Busch, Fl. cauc. crit. III, 4 (1909) 388. — C. sativa Fries, Nov. fl. suec. mant. III (1832—1842) 72. — Ic.: N. Zinger, l. c.; N. Busch, Fl. Sib. et Or. Extr. III, 284 et tab. geogr. 286.

Annual, 30—80 cm high, pubescent mainly with fine, bipartite hairs, often simple, sometimes glabrescent; stem more or less branching, mostly above; leaves comparatively few, remote. Racemes not long; sepals ca. 3 mm long; petals ca. 5 mm, yellowish; fruit ovate, rounded at apex, with a narrow rim, indehiscent up to maturity, 7—10(12) mm long, 4—6(7) mm broad; valves strongly convex, rather hard, but thinner and more delicate than in C. pilosa; seeds 1.5–2(2.5) mm long, ca. 1 mm broad; style 1.5–2 mm long; fruiting pedicels thin, 15–25 mm long, strongly declinate from stem, often subhorizontal. April–June.

A weed in various crops and a ruderal plant; cultivated in some places. Spring annual. — European part: Kar.-Lap., Dv.-Pech., Lad.-Ilm., U. Dnp., U.V., V.-Kama, M. Dnp., V.-Don, Transv., Bl., Crim., L. Don; Caucasus: all
601 regions. Siberia: West, East; Far East: Ze.-Bu., Uda, Uss.; Centr. Asia: Balkh., Dzu.-Tarb., Syr D. **Gen. distr.**: Scand., Centr. Eur., Atl. Eur., Jap.-Ch., N. Am. Described from western Europe.

Note. Here we may add: 1) C. sativa var. crepitans Sinsk., l. c. Low plant, usually branching, with thin stem. Fruit 8–10 mm long on horizontally recurved pedicels; seeds yellow, 1.8–2 mm long; valves readily dehiscing and seeds easily falling already at the beginning of ripening. Infests fields of common flax (Linum crepitans) in the Chernigov area; 2) C. sativa Crantz var. sublinicola N. Zing. refers to the number of transitional forms between C. glabrata and C. linicola. In the size of seeds and fruit, C. s. var. sublinicola is related to C. linicola but in other characters (pubescence, the harder stem, branches) it is similar to C. glabrata.

7. **C. linicola** Sch. et Sp. in Spenner, Fl. Friburg. (1829) 958; N. Zinger l. c. — C. sativa Crantz var. linicola N. Busch, Fl. cauc. crit. III, 4 (1909) 389; Sinskaya, l. c. — C. foetida Fries, Nov. fl. suec. mant. III (1842) 70. — C. dentata Pers., Syn. pl. (1807) pp. 191. — Exs.: HFR No. 1954.

Annual, yellow-green plant, glabrous, only separate branching hairs seen under magnification, with thin, herbaceous stem nearly simple, 30–80 cm high; leaves few, remote, thin, delicate. Sepals oblong-lanceolate, 3–4 mm long; petals whitish-yellowish, 5–6 mm long, ca. 1.5 mm broad; fruit large, 9–12(13) mm long, 5–7 mm broad, usually obtuse at apex and narrowly margined, with thin valves, several developed ones (numbering from few, often up to 10); fruiting pedicels long, strongly declinate from stem; seeds 2.5–3 mm long, ca. 1.5 broad; style 1.25–1.5 mm long. Early spring annual. May.

Weed among common flax in Northwestern regions. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., U. Dnp., U. V., V.-Kama. **Gen. distr.**: Scand., Centr. Eur., Atl. Eur. Described from Central Europe.

8. **C. caucasica** (Sinsk.) Vass., Sp. nova in Addenda VII, p. 489. — C. sativa var. caucasica Sinsk., Tr. prikl. bot., gen. i sel. 2, XIX (1928) 544. — Ic.: Sinsk., l. c.

Annual, 40–50 cm high plant; stem coarse, profusely branching nearly from base, branches long, ascending, densely covered mainly with finely branched hairs; cauline leaves long, linear-lanceolate (up to 20–50 mm long), sessile, sagittate at base, relatively short-auricled. Sepals oblong-lanceolate, ca. 3 (?) mm long; petals linear, somewhat dilated at apex, ca. 5 (?) mm long; fruit numerous, 9–10 mm long, 4–5 mm broad, with long, delicate, laterally concave, narrow valves (as broad as half their length or
602 less), finely netted, with a thin longitudinal rib in the middle; style 1.2–1.8 mm long; fruiting pedicels thin, 10–15 mm long, ascending from stem at an acute angle; seeds dull reddish brown, 1.8–2 mm long.

Spring annual, infesting flax crops, cultivated elsewhere for the oil used in food. — Caucasus: S. and E. Transc. Endemic. Described from Transcaucasia. Type in Leningrad.

Genus 689. **NESLIA** * DESV.**

Desv., Journ. de Botan. III (1813) 162.

Sepals erect, not saccate. Petals clawed, yellow. Filaments free, edenticulate. A crescent-shaped nectariferous gland at both sides of the shorter stamens with short outer appendages directed toward the longer stamens, glands adjacent or even united. Ovary sessile, style elongated. Fruit indehiscent, globose, nut-shaped, with pitted-reticulate shell, usually unilocular and 1-seeded, rarely bilocular and then 2-seeded and with septum. Cotyledons flat, embryo notorrhizal. Hairs coarse, branching. — Annuals, with cauline leaves sagittate at base.

1. Silicle compressed-globose (broader than long), with 1 circular rib. . . . . 1. **N. paniculata** (L.) Desv.
+ Silicle orbicular, regular, as broad as long, with 2 intersecting circular ribs . . . . 2. **N. apiculata** Fisch. et Mey.

1. **N. paniculata** (L.) Desv., l. c.; DC., Prodr. I (1824) 202; Ldb., Fl. Ross. I (1842) 214; N. Busch, Fl. cauc. crit. III, 4 (1909) 395 (p. p.); N. Busch, Fl. Sib. et Or. Extr. 3 (1919) 290; Krylov, Fl. Zap. Sib. VI (1931) 1316. — Myagrum paniculatum L., Sp. pl. (1753) 894. — Vogelia paniculata Hornem., Hort. Hafn. II (1819) 594. — Ic.: Rchb., Icon. Fl. Germ. t. XXIV; Voron., Fl. Yu.-V. (1931) 423; N. Busch, Fl. Sib. et Or. Extr. III (1919) 291 et tab. geogr. 292; Vasil'ch. in Sorn. r. SSSR III (1934) fig. 214.

Annual, 20—80 cm high; stem erect, branching above; leaves usually dentate at margin, rarely subentire, lower leaves oblong, tapering into a petiole, cauline leaves sessile, lanceolate, sagittate at base. Racemes very elongated and dense in fruit; sepals ca. 1.5 mm long; petals oblanceolate, narrowing below into a claw, 2—3 mm long; silicles slightly compressed (broader than long), reticulate-rugose, pitted, nerves thickened and flat,
603 shortly beaked at apex, beak small with slightly protuberant base resembling base of silicle ("hilum"), circularly ribbed along suture, 2—2.5(2.8) mm long, 2.2—2.8(3) mm broad. May—June. (Plate XX, Figure 2).

Fields, slopes, as a weed. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., U. Dnp., U. V., V.-Kama, M. Dnp., V.-Don, Transv., Bl., Crim., L. Don, L. V.; Caucasus: Cisc., Dag., S. Transc.; West Siberia: Ob, U. Tob., Irt., Alt.; East Siberia: Ang.-Say., Lena-Kol., Dau.; Far East: Ze.-Bu., Uss., Sakh.; Centr. Asia: Balkh., T. Sh. **Gen. distr.:** Centr. Eur., Scand., Canada. Described from Europe. Type in London.

2. **N. apiculata** Fisch. et Mey., Index VIII Sem. Hort. Bot. Petrop. (1842) 68; Vasil'ch. in Zap. po Semenov. I, VII (1929) 23. — Vogelia apiculata Vierh.,

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* After J.A.N. de Nesle, French botanist.

** Treatment by I.T. Vasil'chenko.

Oest. Bot. Zeit. 6–8 (1921) 167–172. — Neslia thracica Velen., Fl. Bulg. (1891) 47. — Ic.: Vierhapp., l. c.; Vasil'ch., l. c.

Annual, 30–80 cm high, more delicate than N. paniculata, covered with branched hairs; radical leaves oblong, tapering into a petiole; cauline leaves sessile, sagittate at base, lanceolate. Racemes more loose and fruit not as many as in N. paniculata; silicles regularly orbicular, as long as broad, 2.5–2.8(3) mm; nerves at surface thin, alveolate and finely granular, two-ribbed, one rib along suture appearing like an acutely elevated radially nerved margin, the second rib thinner; hilum and base of style highly conspicuous. March. (Plate XX, Figure 1).

Fields, slopes. — European part: Crim. (southern shores); Caucasus: Dag., E. and S. Transc.; Centr. Asia: Syr D., Kyz. K., Kara K., Mtn. Turkm., Amu D. **Gen. distr.**: Atl. Eur., Med., Bal.-As. Min., Iran., Ind.-Him. Described from the Sinai Peninsula. Type in Vienna.

Genus 690. **CAPSELLA*** MEDIC.**

Medic., Pflanzengatt. I (1792) 85.

Sepals erect, not saccate. Petals short-clawed, white or pinkish or pale yellow. Filaments free, edenticulate. A crescent-shaped nectariferous gland at both sides of the shorter stamens, glands nearly adjacent, with a linear appendage toward the longer stamens. Ovary sessile, style short. Fruit a 2-valved, laterally compressed, obtriangular-cordate silicle with a 604 narrow septum. Valves boat-shaped, thin-walled, netted-veined. Cells many-seeded. Seeds pendulous, cotyledons flat, embryo pleurorhizal. Hairs simple and branching. — Annuals.

Capsella bursa-pastoris (L.) Medic. in interglacial (Mindel-Riss) deposits of the Volga area (Lower Volga).

1. Plant green, flowers white, persistent, portion of style ca. 0.25 mm long . . . . 2.
+ Plant gray-green, flowers pale yellow. Persistent portion of style 0.5–0.5 mm long . . . . 3. **C. orientalis** Klokov.
2. Silicles more than 3 mm in size, triangular-cordate, prominently angled at apex . . . . 1. **C. bursa-pastoris** (L.) Med.
+ Silicles smaller, cordate, rounded at apex . . . . 2. **C. hyrcana** Grossh.

1. **C. bursa-pastoris** (L.) Medic., Pflanzengatt. (1792) 85; DC., Prodr. I (1824) 177; Ldb., Fl. Ross. I (1842) 199; Boiss., Fl. Or. I (1867) 340; Prantl in Engl.-Pr. Nat. Pflanzenfam. III, 2 (1889) 189; Almquist in Acta H. Berg. IV, 6 (1907) 1–99 et VII (1923) 41–95; N. Busch, Fl. cauc. crit. III, 4 (1909) 376–383; N. Busch, Fl. Sib. et Or. Extr. 3 (1919) 276–277, cum tab. geogr.; Kom., Fl. Kamch. II (1929) 180; Kryl., Fl. Zap. Sib. VI (1931) 1313; Voron., in Fl. Yugo-vost. V (1931) 420. — Thlaspi bursa-pastoris L., Sp. pl. (1753) 647. — Ic.: Woron., l. c., Exs.: A. Bge. Al. Lehm. rel. bot. No. 128.

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* From the Latin capsella — case.

** Treatment by I.T. Vasil'chenko.

Annual, covered with simple and branching hairs mainly below; stems (5)20–30(60) cm high, often solitary, rarely several, simple or branching; radical leaves petioled, rosetted, oblong-lanceolate, entire to pinnatipartite, with triangular or oblong-triangular, acute, forward directed lobes, cauline leaves few, sessile, oblong, lanceolate, the upper sublinear, sagittate at base. Raceme umbelliform at first, later elongating; pedicels 2–4 mm long (up to 2 cm in fruit); sepals oblong-ovate, 1–2.5 mm long; petals ovate, white, 1.5–3.5 long, 1–1.3 mm broad; silicles (2.5)5–8 mm long, 4–5(8) mm broad in upper part, obtriangular-cordate, slightly emarginate at apex, notch generally up to 1 mm in depth. Persistent portion of style 0.25 mm long, rarely longer; valves triangular-boat-shaped, thin-walled, slightly carinate; seeds oval, flattened, yellowish brown, 1–2.5 mm long, 0.5–0.75 mm broad. March–May.

Weed everywhere in villages, roadsides, fences, vegetable gardens and fields. Distributed throughout the Soviet Union except for the Arctic. **Gen. distr.:** Occurs in all parts of the world except in the tropics. Described from Europe, Type in London.

605 Note. C. bursa-pastoris is highly polymorphic, varying markedly in all its parts (morphologically); biologically, it has winter, spring and ephemeral forms which sometimes yield several generations in one year. All these combined have caused some authors to isolate many forms from this species.

Economic importance. Seeds contain up to 20% oil.

2. **C. hyrcana** Grossh., Fl. Kavk. II (1930) 188.

Annual; stem low branching (together with racemes) up to 15–20 cm high; leaves, mainly radical, pinnatisect, with linear-lanceolate lateral segments, apical segment often larger than the lateral; cauline leaves few, small, sessile, oblong-lanceolate, sagittate at base. Racemes short and dense at first, later elongating; sepals ovate, scarious-margined in upper part, ca. 1–1.25 mm long; petals whitish, oblong-obovate, 1.5 times as long as sepals; fruiting pedicels thin, declinate from stem, 2–7 mm long; silicles obcordate, ca. 2–3 mm long and nearly as broad, convex-arcuate and rounded at apex, with small, shallow notch, persistent portion of style in the middle of notch, exserted over margins. April.

Weed. — Caucasus: Talysh. Endemic. Described from Lenkoran Lowland. Type in Leningrad.

3. **C. orientalis** Klok. in Byull. Voronezh. O-Va Est. I (1926) 119–122.

Annual, light- or grayish green, densely pilose below; stem 20(30) cm high, simple or branching; lower leaves oblong, usually sinuate to pinnatisect, lobes triangular, obtuse or rounded-triangular, dentate, nearly as broad as long. Raceme many-flowered, rather dense; sepals 1–1.5 mm long; petals pale yellow, 1.5–2 mm long; fruiting pedicels spreading horizontally, 5–10 mm long, lower pedicels always with simple, rather long hairs; silicle 5–6 mm long, 4–4.5 mm broad, with an always distinct notch 0.75–1.25 mm deep, persistent portion of style much shorter than silicle, 0.5–0.25 mm long. April–June.

Rare, in weed-infested places or at roadsides. — European part: M. Dnp., V.-Don, L. Don. Endemic. Described from the Voronezh Region. Type in Kharkov.

Genus 691. **SUBULARIA** * L.**

L., Sp.pl.ed.1 (1753) 642; Gen. (1754) 290; N. Busch, Fl.Sib.et Or.Extr.I (1913) 81.

Floral axis depressed. Sepals and petals surround the depression [?]. Petals small, white, often wanting. Filaments free, edenticulate. An inter-606 staminal closed ring of nectariferous glands around the ovary. Stigma sessile. Silicle ellipsoidal, 2-valved, with strongly convex valves, each valve 1-nerved. Cells many-seeded. Seeds biseriate. Embryo curved like a horseshoe, forming an arch by the cotyledons, the radicle incumbent. Glabrous annual, aquatic plant, with subulate radical leaves and leafless, few-flowered flower stems.

A boreal genus comprising two species and of circumpolar distribution. Owing to its small size, Subularia aquatica L. is overlooked by the collectors and its real area of distribution is undoubtedly much larger than we know it today. The second species, S. monticola A. Braun is common to Kilimanjaro, 4,000 m.

1. **S. aquatica** L., Sp. pl. (1753) 642; Shmal'g., Fl. I (1895) 93; N. Busch, Fl. Sib. et Or. Extr. I (1913) 83; Kom., Fl. Kamch. II (1929) 164; Kryl., Fl. Zap. Sib. VI (1931) 1257. — Ic.: N. Busch, l. c., 83 et tab. geogr. 84. — Exs.: HFR No. 7.

Annual, small slender plant, 2—6 cm high. Flower stems with few-flowered racemes (usually 2—7-flowered); flowers remote, small; sepals 0.75—1 mm long; petals ca. 2 mm long, obovate, short-clawed, white; stigma entire, sessile; fruiting pedicels 3—5 mm long; silicles 3.5—4.5 mm long, 1.5—1.9 mm broad, cells 4—7-seeded; seeds yellowish brown, smooth, 0.75—1 mm long, 0.5—0.6 mm broad. Fl. May—July with flowers cleistogamic under water.

Lakes and rivers. — European part: Kar.-Lap., Lad.-Ilm., Dv.-Pech., U. Dnp., U. V., V.-Kama, V.-Don, Transv.; W. Siberia: U. Tob. (Orenburg), Alt.; Far East: Kamch. **Gen. distr.:** Iceland, Scand., Atl. and Centr. Eur., NE Am., W. Greenland. Described from Europe. Type in London.

Note. Occurs in two forms: f. terrestris Warion — terrestrial and f. immersa N. Busch — immersed. The immersed form is usually larger, more leafy and with more flowers than the terrestrial form.

Family LXXI. **RESEDACEAE** DC.†

Flowers bisexual or rarely unisexual, zygomorphic, with hypogynous disk; sepals 2—8-partite, petals free, 0—8, entire or 3—11-partite, with a limblike appendage; hypogynous disk sessile or stalked, more developed toward axis; stamens 3—40, forming a tube at base, rarely free. Pistils 2—6, free or united above the 1-celled ovary; stigma sessile; seeds small, reniform. Annuals, biennials, some perennials.

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* From the Latin subula — awl.

** Treatment by N.A. Bush.

† Treatment by E.G. Chernyakovskaya.

607 Genus 692. **RESEDA** * L.

L., Sp.pl.ed.1 (1753) 448 p.max.p.; Gen.pl.ed.5 (1754) 275.

Flowers bisexual, zygomorphic, with hypogynous disk, white, yellow or yellowish, in apical, simple, many-flowered, racemose or spicate inflorescences, 1-bracteolate, petals and sepals hypogynous; calyx persistent in fruit or deciduous, 4–6-sect nearly to base; petals free, as many as the sepals and alternating with them, dilated beneath into a laminated scarious appendage, the upper larger, 3–11-sect, the lower usually 1-lobed; hypogynous disk secund, well developed; pistils united above the 1-celled ovary; gynoecium 3–4-nerved, 3–4-toothed, ovules numerous, 2–4-rowed. Capsule sessile or stalked, 3–6-angled, open at top, many-seeded.

Economic importance. Many of the species of Reseda are of practical significance; some of them are used as dyes, like the yellow color extracted from the stems, leaves, and flowers. (R. luteola, lutea, alba, and, apparently, R. hemithamnoides); the fragrant R. odorata is an ornamental plant.

1. Sepals 4, flowers 4-merous; leaves entire, lanceolate-linear; inflorescence long, dense, spicate . . . . 1. **R. luteola** L.
+ Sepals 6, flowers 6–8-merous . . . . 2.
2. Sepals persistent in fruit . . . . 3.
+ Sepals deciduous . . . . 7.
3. Capsule large, pendulous, seeds pitted-wrinkled; leaves entire, upper leaves sometimes 3-partite; lateral lobes of upper petals 4- to 6-partite, with linear-spatulate lobes . . . . 4.
+ Capsule medium-sized, erect, seldom pendulous; seeds smooth; leaves 3- to 5-partite; lateral lobes of upper petals crescent-shaped, entire or broadly crenate . . . . 5.
4. Stem erect; lower leaves entire; petals 3-partite, lateral lobes 4-partite; flowers odorless . . . . 2. **R. inodora** Rchb.
+ Stem decumbent to ascending, many-branched; leaves entire, rarely upper leaves 3-partite; lateral lobes of upper petals 6-partite. Flowers aromatic . . . . ★3. **R. odorata** L.
5. Capsule ovoid, oblong, triquetrous, tridentate; sepals linear-lanceolate; petals yellow; filaments scabrous . . . . . . 4. **R. lutea** L.
608 + Capsule globose-flattened, broader than long, 6-grooved, acutely 3-toothed; sepals oblong-lanceolate; petals pale yellow; filaments [more or less] glabrous . . . . 6.
6. Plant glabrous, stem erect, filaments and capsules glabrous; fruiting pedicels 6–9 mm long . . . . . . 5. **R. globulosa** Fisch. et Mey.
+ Leaves, stems, and capsules villous-hairy, filaments scabrous. Fruiting pedicels up to 3 mm long . . . 6. **R. brevipedunculata** N. Busch.
7. Seeds glabrous, smooth . . . . 8.
+ Seeds finely wrinkled-pitted . . . . 9.
8. Plant glabrous or stems slightly villous-scabrous near base; leaves oblong, 3–5 cm long, up to 2 cm broad, or oblong-lanceolate; petals 9- to 11-partite; capsules small, 4–6 mm long, pyriform-oblong-compressed, not rounded at apex, shortly and obtusely tridentate . . . . 7. **R. aucheri** Boiss.

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* The word reseda is of Latin origin and, according to Pliny, denotes its sedative property.

+ Entire plant villous-scabrous. Leaves narrowly lanceolate, 2—4 cm long, 3—10 mm broad; upper petals 7-partite, with longer median lobe, lower petals with entire blade. Capsules 5—8 mm long, cylindrical, slightly tapering below, sulcate, tridentate . . . . 8. **R. bucharica** Litw.

9. Flowering racemes loose . . . . 10. **R. microcarpa** J. Müll.

+ Flowering racemes dense . . . . 11. **R. hemithamnodes** Czerniak.

10. [sic] Plants glabrous. Stems semidecumbent to ascending . . . . . 10.

+ [sic] Plants shortly villous-scabrous. Stems erect; leaves lanceolate, 3—3.5 mm long, 3—6 mm broad. Capsules oblanceolate, 6—8 mm long . . . . 9. **R. dshebeli** Czerniak.

1. **R. luteola** L., Sp. pl. ed. I (1753) 448; M. B., Fl. taur.-cauc. I (1808) 368; Ldb., Fl. Ross. I (1842) 235; Muell.-Arg., Monogr. Résédac. (1857) 202; Boiss., Fl. Or. I (1867) 434; N. Busch, Rhoead. in Fl. cauc. crit. III, 4 (1910) 727. — Ic.: Rchb., Ic. Fl. Germ. tab. 99, f. 4442; Muell.-Arg., Monogr. tab. IX, f. 124.

Biennial; stems usually solitary, rarely several, erect, simple or sometimes branching above, later sulcate-angular, glabrous, densely leafy, 30—130 cm tall, with erect strict branches; all leaves entire, sessile, linear or narrowly lanceolate-linear or narrowly spatulate, lower leaves oblanceolate-oblong, subobtuse, gradually tapering at base, with 2 small 609 spiniform teeth, glabrous. Inflorescence very long (13—42 cm, in fruit up to 62 cm), narrow, dense, spicate, erect, sometimes branching in lower part; bracts persistent, triangular-aculeate, broad at base; flowers 4-merous, small, subsessile, yellow; pedicels thickened, at the beginning rather short, 1.5—2 mm long, up to 1 mm thick, expanding above toward the calyx; sepals 4, shorter than petals, persistent, ovate-oblong, unequal, the upper larger, obtuse, ca. 2 mm long; petals 3.5—4 mm long, obovate-cuneate, the upper 5—7-partite, the lateral 2—4-partite, the lower usually deeply bipartite; stamens 20—30, filaments glabrous, persistent; capsules dense, small, strict, 3—4 mm long, 3.5—4 mm broad, compressed, obovoid-globose, deeply 6-grooved, acutely tridentate, teeth convergent, triangular-acuminate, broad at base, usually reddish at top; seeds minute, 1 mm, grayish brown, smooth, glabrous, glossy. Fl. May, Fr. July—September.

Dry hills and grassy slopes, steppes, rivers, ravines, roadsides, weed-infested places, fallow fields, among crops. — European part: Crim.; Caucasus: Cisc. (introduced), Dag., E. and S. Transc.; Centr. Asia: Mtn. Turkm., Pam.-Al. **Gen. distr.**: Scand., Centr. Eur., W. and E. Med., Bal.-As. Min., Iran., America (introduced). Described from Europe. Type in London.

2. **R. inodora** Rchb., Ic. Fl. Germ. II (1838) 22; Muell.-Arg., Monogr. Résédac. (1857) 139; Boiss., Fl. Or. I (1867) 428. — R. mediterranea Sadler, Verz. (1818) 71; Ldb., Fl. Ross. I (1842) 236 (non L.). — Ic.: Rchb., Ic. Fl. Germ. II (1838) tab. 99, f. 4445; Muell.-Arg., l. c. tab. VII, f. 99.

Biennials or perennials, glabrous; stems erect, branching; lower leaves entire, spatulate, the rest 3-partite, lobes lanceolate, slightly acuminate. Flowering racemes ovate, later elongating; pedicels 4—6 mm long, twice as long as flowers, sulcate-angular, scabrous; bracts linear, acuminate, 3—4 mm long, scabrous at margin, half as long as pedicels; flowers white; sepals persistent, linear-spatulate, nearly as long as petals; upper petals 3-partite, lateral lobes deeply bilaterally 4-partite, lobes twice as long as the short median (petal) lobe; filaments glabrous, linear-subulate; capsules suberect or often declinate, slightly drooping, large, up to 12 mm long, obovate-oblong, triquetrous, acutely triangular, tridentate, teeth villous, broadly open, sulcate-angled, scabrous, borne on 8—10 mm long, divergent pedicels; seeds 2.25 mm long, pitted-wrinkled. June—July.

Weedy places, sometimes rocks. — European part: U. V., V.-Don, Bl., L. Don. **Gen. distr.:** Bal.-As. Min. Described from the Balkan peninsula. Type in Vienna.

610 ★3. **R. odorata** L., Sp. pl. ed. 2 (1762) 646; Muell.-Arg., Monogr. Réséd. (1857) 128; Boiss., Fl. Or. I (1867) 428. — Ic.: Muell.-Arg., l. c. tab. VI, f. 95; Rchb., Ic. Fl. Germ. tab. 99, f. 4444.

Annual, glabrous or slightly scabrous; stems low, decumbent or ascending, branches spreading above, leafy; leaves often entire, spatulate, rarely the upper 3-partite, lobes lanceolate. Flowering racemes short-ovate; flowers white, fragrant, small; bracts linear-lanceolate, subobtuse, 2—2.5 mm long; pedicels 4—6 mm long, twice as long as calyx; sepals persistent, narrowly spatulate, as long as petals; lateral lobes of upper petals bilaterally 6-partite; filaments linear-subulate, scabrous, anthers reddish; capsules 7—9 mm long, 4—6 mm broad, pendulous, obovate-globose tubercled, slightly compressed at top, shortly tridentate; seeds large, 1.6 mm long, pitted-wrinkled.

Universally cultivated in gardens, otherwise growing wild. Described from Europe. Type in London.

Economic importance. Used in making perfume.

4. **R. lutea** L., Sp. pl. ed. 1 (1753) 449; Ldb., Fl. Ross. I, 236, 771; Muell.-Arg., Monogr. Réséd. (1857) 183—192; Boiss., Fl. Or. I (1867) 429; Shmal'g., Fl. I (1895) 107; N. Busch in Fl. cauc. crit. III, 4 (1910) 729—738. — R. truncata Ldb., Fl. Ross. I (1842) 236; Muell.-Arg., Monogr. Réséd. 182 (part., quoad locum Tauria). — R. orthostyla C. Koch in Linnaea XV (1845) 705; Ldb., Fl. Ross. I, 771. — R. lutea var. besseriana Muell.-Arg., Monogr. (1857) 189. — R. lutea var. orthostyla Muell.-Arg. in DC., Prodr. XVI, 2 (1868) 570. — Ic.: Rchb., Ic. Fl. Germ. tab. C, f. 4446; Muell.-Arg., Monogr. f. 18—31, 37, 54, 60, 74; Fl. Yugo-Vost. V (1931) 464, Fig. 406. — Exs.: Herb. Fl. Cauc., No. 222.

Biennial or perennial; stems erect or ascending, 30—85 cm tall, branching, villous-scabrous; leaves 3- to 5-partite, only the lower leaves sometimes entire; lobes entire or 2- to 3-partite, usually oblong-lanceolate, upper leaves linear, median lobes in lower leaves often broad, suborbicular-lyrate. Racemes pyramidal, short, later elongating, 21—35 cm long, rachis glabrous; sepals 6, 2—3.5 mm long, linear-lanceolate, nearly as long as petals, persistent in fruit; petals 6, yellow, 3—5 mm long, the upper blade 3-partite, middle lobe linear-spatulate, half as long as the lateral, lateral lobes crescent-shaped, more or less remotely denticulate; stamens 10—24, deciduous, filaments slightly scabrous, broader at top; pedicels rather long, 3—7 mm long; capsule erect, cylindrical, ovoid-oblong, triquetrous, shortly and acutely 3-toothed, 7.5—16 mm long, 3.5—6 mm broad, broadly

611 open at tip, villous-scabrous or smooth along ribs; seeds large, smooth, black, glossy, 1.5–1.7 mm long, 1–1.3 mm broad. June–August.

Slopes, dry hills, steppes, sandy, clayey, and stony soils, fields, roadsides, fallow fields, weedy places, crops, vegetable gardens, vineyards, limestone and chalky rocks.— European part: Dv.-Pech., Lad.-Ilm., U.V. Wild: U. Dnp., M. Dnp., V.-Don, Bl., Crim., L.-Don; Caucasus: Cisc., Dag., E., and S. Transc.; W. Siberia: U. Tob. (only rarely in the Temir and Uralsk regions); Centr. Asia: Mtn. Turkm. **Gen. distr.:** Centr. Eur., W. and E. Med., Iran. Introduced into N. Am. Described from southern Europe. Type in London.

Note. R. lutea L. is a highly polymorphic species: the plants are glaucous or green, sometimes glabrous, at times more or less villous-scabrous, stems are ascending to erect and leaves are diversely dissected. Two forms are reported by N. A. Busch in Fl. cauc. crit. l. c. — f. dolichocarpa N. Busch and f. brachycarpa N. Busch, the first with long and the second with short fruit. Correlated with a certain geographic range is var. nutans Boiss., Fl. Or. I (1867) 430; R. clausa Rchb. in Muell.-Arg., Monogr. Réséd. 192, with drooping or pendulous capsules and elongated erect teeth.

5. **R. globulosa** Fisch. et Mey. in Ind. sem. Hort. Petrop. IV (1837) 45 et in Linnaea XII (1838) 167; Ldb., Fl. Ross. I, 236, 772; Muell.-Arg., Monogr. Réséd. (1857) 194; Boiss., Fl. Or. I (1867) 430; Suppl. (1888) 69; Muell.-Arg. in DC., Prodr. XVI, 2 (1868) 566; N. Busch in Fl. cauc. crit., III, 4 (1910) 738–739.— Ic.: Muell.-Arg., Monogr. Réséd. (1857) tab. IX, f. 120 (flos et fructus).— Exs.: Herb. Fl. Cauc. No. 221.

Annual, completely glabrous; stems erect, slightly branching, 12–75 cm tall, angular in upper part; leaves 3–5-partite with narrowly linear lobes. Racemes loose, ovate-oblong, later elongating, 5–33 cm long; pedicels 5–6 mm long, longer than the flowers; sepals persistent, oblong-lanceolate, 1.2–2.2 mm long, half as long as petals; petals whitish or pale yellow, 3–4 mm long, lateral lobes of upper petals crescent-shaped, broadly emarginate; filaments glabrous, persistent; fruiting pedicels 6–9 mm long; capsules erect, glabrous, globose, slightly compressed, slightly broader than long, 3.5–4.5 mm long, 5–7.5 mm broad, 6-grooved, acutely 3-toothed, distinctly constricted at apex; teeth conical, broad at base; seeds grayish brown, shiny, smooth, 1.5 mm long, 1 mm broad. Fl. April–May, Fr. May–August.

Rocks, dry stony places, limestones, dry hills, ravine slopes, steppes, and semideserts.— Caucasus: Cisc., E. Transc., Dag. Endemic. Described from Shirvan. Type in Leningrad.

612 6. **R. brevipedunculata** N. Busch, sp. nova in Addenda VII, p. 491.— R. globulosa f. brevipedunculata N. Busch, Fl. cauc. crit. III, 4, 739.

Annual; stems usually low, 12–30 cm tall, ascending, villose-pubescent along angles, branching; leaves villous-pubescent, especially along margin, petioles and lower vein; filaments slightly scabrous; fruiting pedicels short, up to 3 mm long, appressed to stem, slightly scabrous. Capsules sparingly pubescent at the angular projections. Otherwise, similar to the preceding species. April–June. (Plate XXXIV, Figure 5).

Dry, limestone slopes, 1,000–3,000 m.— Caucasus: Dag. (Akhty). Endemic. Described from Akhty. Type in Leningrad.

7. **R. aucheri** Boiss., Diagn. pl. nov. or. Sér. I, 1 (1842) 5; Muell.-Arg., Monogr. Résédac. (1857) 146; Boiss., Fl. Or. I (1867) 434.— Ic.: Muell.-Arg., l. c., tab. VII, f. 103.

Annual, glabrous; stems erect, branching, tall, leafy, glaucescent, glabrous or slightly villous close to base; all leaves entire, glaucescent, glabrous, 3–5 cm long, up to 2 cm broad (sometimes 3 cm), oblong or oblong-lanceolate. Flowering racemes long, dense, narrowly cylindrical, tufted at top with protruding bracts; pedicels shorter than flowers; sepals obovate-lanceolate, half as long as flowers; petals pale yellow, with 9–11 linear-spatulate lobes; stamens not deciduous; capsules slender, pyriform, shortly oblong, erect, rounded at apex, 4–6 mm long, not laterally compressed, very shortly and obtusely tridentate to almost edentate, dense; seeds minute, ca. 1 mm, straw-colored, rounded-reniform, completely glabrous, papilliform-thickened at hilum.

Centr. Asia: Mtn: Turkm. (Kushka region — single population, introduced, occurring as a weed at roadsides). **Gen. distr.**: S. Iran, Mesopotamia. Described from southern Iran. Type in Geneva.

Note. Reports on finding this species in Central Asia are unreliable; confirmation of the locality must be obtained.

8. **R. bucharica** Litw. in Trav. Mus. Bot. Ac. Sc. I (1902) 15.— R. aucheri, β asperula Boiss., Fl. Or. I (1867) 434.

Annual; stems numerous, simple or somewhat short-branched, erect, densely leafy, up to 40 cm tall; leaves erect, glaucous, simple, narrow, entire, acuminate, lower leaves narrowly lanceolate, the upper linear-lanceolate, 2–4 cm long, 3–10 mm broad, usually with reduced leafy branches in axils;
615 stems and leaves covered with fine, soft, villous-papillate hairs at margin and nerves. Flowers ca. 5 mm long; racemes erect, spicate, dense, rather angustate, prominently bracteate; bracts linear, filiform-attenuate at apex, ca. 2 mm long, 0.2–0.3 mm wide, softly papillose-villous; pedicels rigid, 1.5–2 mm long, villous; sepals deciduous, lanceolate, obtuse, villous, membranous-margined, ca. 1.5 mm long; petals pale yellow, twice as long as sepals, upper petals with a 7-partite blade, lobes linear-spatulate, the middle lobe longer than the others, appendage obovate or suborbicular, shortly ciliate at margin, lower petals with entire blade; filaments subulate, ca. 3 mm long, glabrous; ovary linear, obtusely triquetrous, papillose-villous at the angles, slightly tapering at base, compressed at margin, with 3 erect and obtuse short teeth 4 times as long as the ovary; ovules 2- or 3-rowed, 19–24 on each placenta; capsules cylindrical, 5–8 mm long, slightly tapering below, sulcate, obtusely tridentate; seeds small, reniform, 0.5–0.75 mm long, blackish brown, glossy, papilliform-thickened at the hilum. (Plate XXXIV, Figure 4).

Cliffs.— Centr. Asia: Pam.-Al. **Gen. distr.**: NE and E. Iran. Described from Pamir-Alai area (Kabadian River, Kaiki-Tau Mountain pass near Bishkent). Type in Leningrad.

9. **R. dshebeli** Czerniak. sp. nova in Addenda VII, p. 490.

Annual; stems 1 or 3, up to 40–45 cm high, erect, seldom ascending, branching from base; entire plant sparsely short-villous; leaves glaucescent, lanceolate, short-petiolate, 3–4 cm long (including petioles), 3–6 mm broad,

(613)

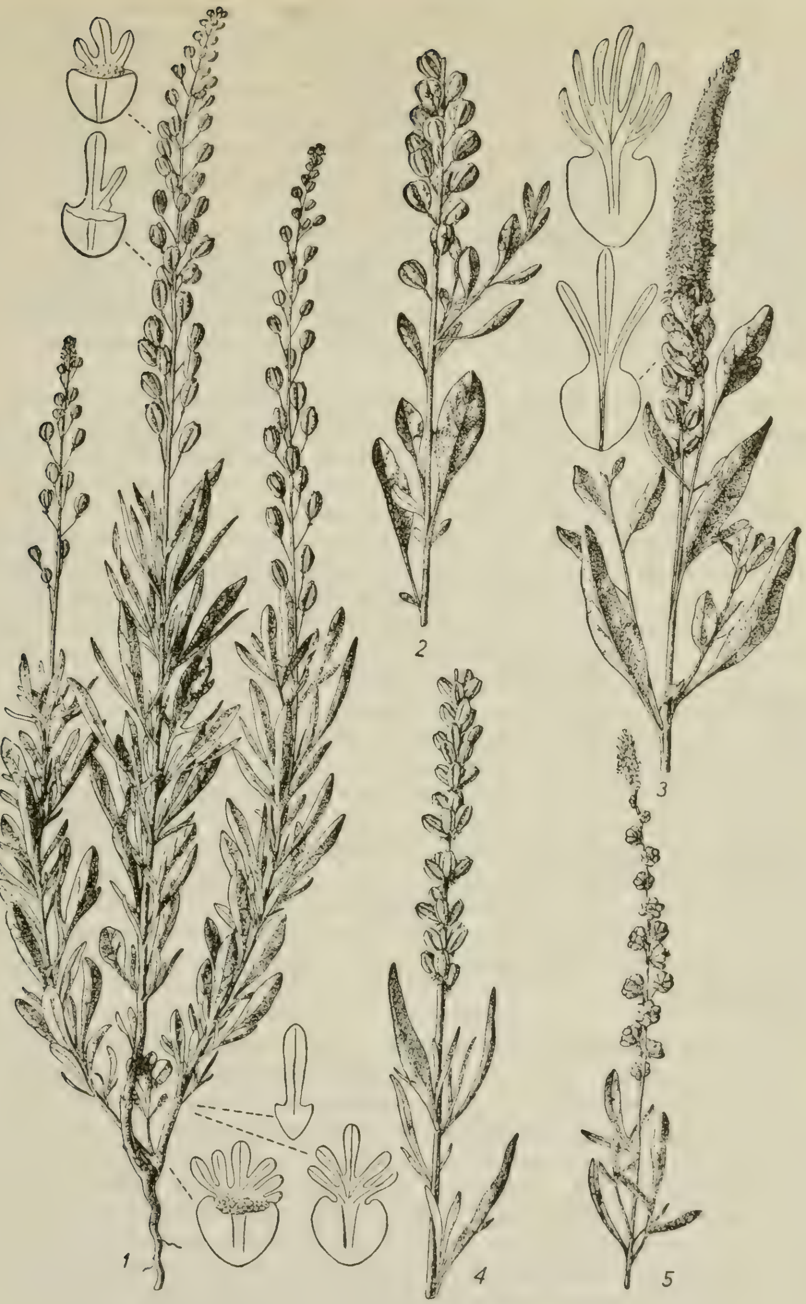

PLATE XXXIV. 1 – Reseda dshebeli Czerniak, and petals; 2 – R. microcarpa Müll.-Arg.; 3 – R.hemithamnoides Czerniak, and petals; 4 – R.bucharica Litw.; 5 – R. brevipedunculata N.Busch.

bluntly acuminate, upper cauline leaves narrowly lanceolate, some of the lower cauline leaves broader, up to 12 mm, sometimes with 1 or 2 lateral lobes. Racemes loose, strongly elongating in fruit, up to 20 cm; pedicels 2–4 mm long, bracts subulate, longer than the pedicels; calyx and stamens deciduous; sepals 6, oblong-ovate, obtuse, ca. 3 mm long; petals 5–6-lobate; capsules stalked, 6–8 mm long, obovate, shortly tridentate, borne on 5 mm long ascending pedicels; seeds small, 1 mm long, black, glossy, finely alveolate. May. (Plate XXXIV, Figure 1).

Foothill gravels. — Centr. Asia: Mtn. Turkm. (Greater Balkhan Range). **Gen. distr.:** N. Iran. Described from Dzhebel. Type in Leningrad.

Note. This species is related to R. microcarpa Muell.-Arg. from which it is distinguished by shape of leaves, erect stems, papilliform pubescence and considerably longer pedicels, particularly in fruit.

10. **R. microcarpa** Muell.-Arg. in Bot. Zeit. XIV (1856) 35; Monogr. Résédac. (1857) 148; Boiss., Fl. Or. I (1867) 431; N. Busch, Fl. cauc. crit. III, 616 4 (1910) 739–740. — R. mira Bordz. in Bull. Jard. Bot. Kieff VII, VIII (1928) 17. — Ic.: Muell.-Arg., Monogr. Réséd. (1857) tab. VII, f. 104 (fructus). — Ic.: Bordz., l. c., f. 4. — Exs.: Herb. Fl. Cauc., No. 223.

Annual, glabrous, glaucous; stems erect or ascending nearly decumbent at base, 30–44 cm tall, simple or branching from base, glabrous; all leaves entire, glaucous, glabrous, coriaceous, obovate-spatulate or often lanceolate-spatulate, 5 cm long (including petioles), 8–12–17 mm broad, upper cauline leaves oblong, cartilaginous-margined, short acuminate, gradually tapering into a petiole. Racemes loose, elongated, 9–22 cm long; pedicels as long as flowers; sepals oblong-lanceolate, broadly membranous-margined, 1.8–2 mm long, deciduous; upper petals yellowish pink, 3-partite, lateral lobes deeply dissected into 3–4 linear-spatulate lobules; filaments deciduous, linear-subulate, glabrous; fruiting pedicels glabrous, thin, 1.8–2.5 mm long, suberect; capsules medium-sized, erect, glabrous, 5–7 mm long, 4.5–5.8 mm broad, pyriform, tapering at base, on 1 mm long gynophore, constricted at apex, shortly tridentate, 1–1.3 mm across, black, punctulate-pitted, lusterless. May. (Plate XXXIV, Figure 2).

Dry hills, stony slopes. — Caucasus: S. Transc. (southern part of the Nakhichevan ASSR). **Gen. distr.:** N. Iran. Described from Iran. (Kara-Dag). Type in Leningrad.

11. **R. hemithamnodes** Czerniak, sp. nova in Addenda VII, p. 490.

Perennial; stems up to 1.5 cm in diameter, branching, sometimes ascending, branches 45–90 cm long, whitish, thin-ribbed; leaves glaucous, oblong-lanceolate, tapering at both ends, short-petiolate, glabrous, blade 3–5.5(6.5) cm long, 7–15 mm broad, petioles 1 cm long; young leaves and stems sparsely villous. Racemes up to 25 cm long, very dense, axis glabrous; flowers short-pedicelled; sepals 6, ca. 3 mm long, shorter than petals; petals 6, golden-yellow, upper petals 7-partite with spatulate-oblong obtuse lobes, the median longer, the lower petals 3-partite with the same shape of lobes; ovary on gynophore, shortly tridentate, teeth obtuse, broad, triangular at base; fruiting pedicels 2 mm long; capsules up to 9 mm long, obovate, tapering below, glabrous, very dense and rather imbricate, on gynophores; seeds 1 mm in diameter, brown, slightly rugose-pitted, bean-shaped, reniform, lusterless. Fl. May, Fr. June. (Plate XXXIV, Figure 3).

Slopes of gorges, rocks, clayey bluffs and riparian forests.— Centr. Asia: Pam.-Al. Endemic. Described from Tadzhikistan, Vakhsh Valley lower than Sengtod and Tutkaul. Type in Leningrad.

617 Note. R. hemithamnodes, already reported by Regel (1883), was recorded from the herbaria as a "tall undershrub with brownish flowers," but to this day it has erroneously referred to R. aucheri, with which it has little in common. It is completely isolated from other Reseda species known in the USSR. It is most related to R. alphonsi Muell.-Arg. (Monogr. Réséd. 1857, 144) from which it is distinguished by a more dense raceme, shorter pedicels, and shape of leaves. The relationship of this species to the Algerian R. alphonsi is rather evident since both have 3-partite lower petals, a stalked ovary, and similar structure of the seed coat.

Key to Genera*

1\. Fruit a silicle . . . . 2.
+ Fruit a silique . . . . 85.
2\. Silicles indehiscent, firm . . . . 3.
+ Silicles dehiscing longitudinally by 2 valves . . . . 31.
3\. Silicles with 4 or 8 horns at apex . . . . 4.
+ Silicles without horns . . . . 5.
4\. Silicles globular, angled, with 8 horns, petals white . . . . 629. **Octoceras** Bge.
+ Silicles oblong, with 4 horns at apex, petals yellow . . . . 617. **Tetracmidion** Korsh.
5\. Silicles distinctly winged at margin . . . . 6.
+ Silicles wingless . . . . 15.
6\. Silicles with long, falcate, curved beak at apex . . . . 607. **Spirorhynchus** Kar. et Kir.
+ Silicles without falcate beak at apex . . . . 7.
7\. Cauline leaves pinnate . . . . 8.
+ Cauline leaves entire . . . . 9.
8\. Flowers yellow, silicle lanceolate or oblong . . . . . 668. **Winklera** Rgl.
+ Flowers white or pink, silicle geminate . . . . . . 667. **Megacarpaea** DC.
9\. Plants stellate-hairy . . . . 643. **Clypeola** L.
+ Plants glabrous or simple-hairy . . . . 10.
10\. Perennials . . . . 11.
+ Annuals or biennials . . . . 12.
11\. Plants simple-hairy . . . . 687. **Peltaria** Jacq.
+ Plants glabrous . . . . 666. **Stubendorffia** Schrenk.
618 12. Cells rather flattened, silicle flattened, suberous-thickened at margin . . . . 13.
+ Cells convex . . . . 14.
13\. Silicles large, more than 10 mm long . . . . 601. **Chartoloma** Bge.
+ Silicles small, not more than 5 mm long . . . 602. **Pachypterygium** Bge.

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* This simplified key to genera is a supplement to the main key (see pp. 13–21) and was prepared by I.T. Vasil'chenko.

14. Silicles orbicular or oval, cordate, with broad coriaceous wing and thin style . . . . 604. **Sameraria** Desv.
+ Silicles oval or cuneate or dimorphous, stigma sessile or dimorphous, lower silicles nearly nutlike, the upper flattened, oval or pandurate, slightly constricted above the middle . . . . . 600. **Isatis** L.
15. Silicles densely covered with long, white, silky hairs . . . . 633. **Lachnoloma** Bge.
+ Silicles not as above . . . . 16.
16. Silicles scaphoid, convex on outer side, concave on inner side . . . . 603. **Tauscheria** Fisch.
+ Silicles different, not scaphoid . . . . 17.
17. Silicle clavate, trilocular, a 1-seeded cell in the constricted lower side of silicle, the two other cells hollow, inflated, in the upper broadened side . . . . 599. **Myagrum** L.
+ Silicle unilocular or bilocular, not as above . . . . 18.
18. Silicle geminate, comprising 2 reniform dentate at margin halves . . . . 665. **Coronopus** L.
+ Silicle not as above . . . . 19.
19. Silicle 2-jointed, lower joint flattened, resembling pedicel, the upper joint globular, unilocular, 1-seeded . . . . 20.
+ Silicle 1-jointed, more or less globular or clavate . . . . 22.
20. Flowers yellow . . . . 653. **Rapistrum** Desv.
+ Flowers white or lilac . . . . 21.
21. Silicles tetragonous, 2-jointed, upper joint ensiform, the lower cuneate, both 1-seeded . . . . 654. **Cakile** Mill.
+ Upper joint of silicle globular, 1-seeded, lower joint cylindrical, inconspicuous, hollow . . . . 655. **Crambe** (Tourn.) L.
619 22. Silicle clavate . . . . 568. **Sobolevskia** M. B.
+ Silicle globular or subglobular . . . . 23.
23. Plants glabrous or simple-hairy . . . . 24.
+ Plants with branching hairs . . . . 27.
24. Silicles with thin membranous valves . . . . 25.
+ Silicles with thicker, often nearly ligneous valves . . . . 26.
25. Silicles glabrous . . . . 662. **Lepidium** L. (section Cardaria).
+ Silicles pubescent . . . . 664. **Hymenophysa** C. A. M.
26. Silicles oval-globular, ligneous, nutlike, alveolate-pitted. Leaves lyrate . . . . 656. **Calepina** Adans.
+ Silicles globular, not alveolate, with thinner walls. Leaves entire . . . . 663. **Stroganovia** Kar. et Kir.
27. Silicles with thin membranous walls . . . . . 641. **Physoptychis** Boiss.
+ Silicles with thick ligneous walls . . . . 28.
28. Silicles alveolate-pitted . . . . 29.
+ Silicles slightly sulcate or tuberculate, not alveolate . . . . 30.
29. Flowers yellow . . . . 689. **Neslia** Desv.
+ Flowers white . . . . 628. **Litvinovia** Woron.
30. Flowers yellow. Silicles glabrous . . . . 605. **Bunias** L.
+ Flowers white. Silicles scabrous with stellate hairs . . . . 627. **Euclidium** R. Br.
31 (2). Plants simple-hairy or glabrous . . . . 32.
+ Plants with branching hairs (sometimes mixed with simple ones). . 62.

32. Flowers yellow . . . . 33.
+ Flowers white or lilac . . . . 36.
33. Valves nerveless . . . . 587. **Roripa** Scop.
+ Valves with midrib . . . . 34.
34. Silicles imbricate in dense raceme . . . . . . 673. **Aethionema** R. Br.
+ Silicles in loose raceme or in axils of leaves . . . . 35.
35. Leaves parted. Okhotsk area . . . . 583. **Redowskia** Cham.
+ Leaves entire. Central Asia, Siberia . . . . 566. **Taphrospermum** C. A. M.
36. Silicles 2-horned at apex . . . . 684. **Carpoceras** Boiss.
+ Silicles hornless . . . . 37.
620 37. Silicles globular, netted-veined . . . . 38.
+ Silicles different . . . . 41.
38. Valves membranous, very thin . . . . 40.
+ Valves thick . . . . 39.
39. Valves with distinct midrib. Biennial . . . . 674. **Cochlearia** L.
+ Valves reticulate, without midrib. Perennial . . . . 588. **Armoracia** G. M. Sch.
40. Cells 2-seeded . . . . 679. **Didymophysa** Boiss.
+ Cells 8-seeded . . . . 678. **Coluteocarpus** Boiss.
41. Silicles winged at margin . . . . 42.
+ Silicles wingless or winged at apex . . . . 44.
42. Cells many-seeded. Seeds with concentric ribs . . . 682. **Thlaspi** L.
+ Cells 1–2-seeded. Seeds without concentric ribs . . . . 43.
43. Cells 2-seeded . . . . 681. **Pachyphragma** N. Busch.
+ Cells 1-seeded . . . . 598. **Graellsia** Boiss.
44. Valves dorsally keeled . . . . 45.
+ Valves not as above . . . . 53.
45. Plants with simple pubescence . . . . 46.
+ Plants glabrous* . . . . 47.
46. Outer petals larger than the inner . . . . 672. **Iberis** L.
+ All petals equal (rarely absent) . . . . 662. **Lepidium** L.
47. Annuals . . . . 48.
+ Perennials . . . . 50.
48. Cells many-seeded . . . . 671. **Hymenolobus** Nutt.
+ Cells 1–2-seeded . . . . 49.
49. Petals 1.5–3.5 mm long, outer petals enlarged . . . . 685. **Teesdalia** R. Br.
+ Petals ca. 1 mm long, all equal . . . . 670. **Hutchinsia** R. Br.
50. Each cell few-seeded . . . . 680. **Dilophia** Thoms.
+ Each cell 1–2-seeded . . . . 51.
621 51. Low alpine plant, with orbicular-ovate opposite leaves. Caucasus . . . . 683. **Eunomia** DC.
+ Taller plants, with alternate leaves . . . . 52.
52. Stems leafy, leaves oblong (Kopet-Dagh) . . . 686. **Heldreichia** Boiss.
+ Stems leafless. Radical leaves reniform. Tadzhikistan . . . . 597. **Physalidium** Fenzl.
53. Leaves dissected into 3–5 linear lobes . . . . 592. **Pseudovesicaria** Rupr.

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* See also Lepidium; there are species that are both glabrous and simple-hairy.

+ Leaves not as above . . . . 54.
54. Silicles very large (40–50 mm long), flattened, pendulous; large forest plant with lilac-colored flowers . . . . 634. **Lunaria** L.
+ Silicles much smaller, plant not as above . . . . 55.
55. Cauline leaves sessile, amplexicaul . . . . 56.
+ Cauline leaves petiolate . . . . 58.
56. Petals yellow . . . . 688. **Camelina** Crantz (C. linicola).
+ Petals white . . . . 57.
57. Plants 40–50 cm tall, from rocks in southern Caucasus . . . . ★677. **Pseudosempervivum** (Boiss.) Grossh.
+ Plants 10–20 mm tall, from shores of the northern seas . . . . 674. **Cochlearia** L.
58. Petals ca. 2 mm long . . . . 59.
+ Petals 4–6 mm long . . . . 60.
59. Aquatic plants, 4–6 cm tall . . . . 691. **Subularia** L.
+ Plants 45–80 cm tall, from dry stony places . . . . 675. **Pseudocamelina** N. Busch.
60. Stems leafless. Tadzhikistan . . . . 597. **Physalidium** Fenzl.
+ Stems leafy . . . . 61.
61. Valves netted-veined. Perennials, 50–100 cm tall . . . . 588. **Armoracia** G. M. Sch.
+ Valves with 1 obscure nerve. Biennials, 10–20 cm tall. Transcaucasia . . . . 676. **Peltariopsis** N. Busch.
62 (32). Silicles compressed perpendicularly to septum, obtriangular, somewhat emarginate . . . . 690. **Capsella** Medic.
+ Silicles not as above . . . . 63.
63. Perennial, with large leaves (10–13 mm) and orbicular-oval, densely pubescent, ascending silicles, seeds winged . . . . 635. **Fibigia** Medic.
622 + Plants not as above . . . . 64.
64. Petals yellow . . . . 65.
+ Petals white or more or less pink . . . . 73.
65. Valves chartaceous, strongly convex . . . . . . 640. **Vesicaria** Adans.
+ Valves not chartaceous, thick . . . . 66.
66. Cells 1–2-seeded . . . . 637. **Alyssum** L.
+ Cells with 4 or more seeds . . . . 67.
67. Seeds winged . . . . 638. **Meniocus** DC.
+ Seeds wingless . . . . 68.
68. Silicles obpyriform, inflated. Seeds large . . . 688. **Camelina** Crantz.
+ Silicles different . . . . 69.
69. Valves without midrib . . . . 646. **Draba** L.
+ Valves with prominent midrib . . . . 70.
70. Cauline leaves pinnatipartite . . . . 581. **Sophiopsis** O. E. Schulz.
+ Leaves entire . . . . 72.
71. Leaves petiolate . . . . 585. **Syrenia** Andrz.
+ Leaves sessile, sagittate . . . . 72.
72. Annual, petals 1.8–2 mm . . . . 580. **Chrysochamela** Boiss.
+ Perennial, petals 4–5 mm. Rocks in Lenkoran . . . . 571. **Alyssopsis** Boiss.
73. Cells 1–2-seeded . . . . 74.
+ Cells many-seeded . . . . 77.

74. Silicle laterally compressed, thus septum much narrower than valves . . . . . 670. **Hutchinsia** R. Br.
+ Silicle inflated or compressed from side of valves, thus septum as broad as or broader than valves . . . . . 75.
75. Cells 2-seeded . . . . . 639. **Ptilotrichum** C. A. M.
+ Cells 1-seeded . . . . . 76.
76. Annuals, seeds winged . . . . . 644. **Buchingera** Boiss.
+ Perennials, seeds wingless . . . . . 642. **Koniga** Adans.
77. Silicle laterally compressed (thus septum much narrower than valves), obtriangular . . . . . 690. **Capsella** Medic.
+ Silicle inflated or compressed from side of valves, thus septum as long as or broader than valves . . . . . 78.
78. Petals bipartite . . . . . 79.
+ Petals entire or slightly emarginate . . . . . 80.
623 79. Seeds winged . . . . . 636. **Berteroa** DC.
+ Seeds wingless . . . . . 647. **Erophila** DC.
80. Silicle obpyriform, inflated; seeds large (1.5–2.5 mm long) . . . . . 688. **Camelina** Crantz.
+ Silicle not as above . . . . . 81.
81. Seeds orbicular, flattened, large, winged . . . . . 82.
+ Seeds small, wingless . . . . . 83.
82. Silicles orbicular or oval. Perennials. Caucasus . . 631. **Farsetia**.
+ Silicles elongated, oblong, often panduriform. Annuals (Central Asia) . . . . . 632. **Cithareloma** Bge.
83. Silicle flattened, petals white . . . . . 84.
+ Silicle inflated, petals pink, rarely white . . . . 575. **Braya** St. et Hoppe.
84. Filaments of longer stamens winged, denticulate at base . . . . . 645. **Schiverekia** Andrz.
+ Filaments of all stamens wingless, edenticulate . . . . . 646. **Draba** L.
85 (1). Siliques indehiscent or disarticulating transversally into separate joints . . . . . 86.
+ Siliques dehiscing by 2 valves . . . . . 97.
86. Plants glabrous, siliques 2–3-jointed . . . . . 87.
+ Plants pubescent . . . . . 88.
87. Joints oblong, tetragonous. Cauline leaves entire, sagittate, sessile . . . . . 606. **Goldbachia** DC.
+ Lower joint of silique rhombic-cuneate, the upper ensiform. Cauline leaves pinnatisect . . . . . 654. **Cakile** Mill.
88. Siliques of two kinds: the upper dehiscent, flat-compressed, with broad membranous-margined seeds, the lower indehiscent, with immarginate (or narrowly marginate) seeds . . . . . 621. **Diptychocarpus** Trautv.
+ All siliques equal . . . . . 89.
89. Siliques linear-cylindrical, undulate-torulose, with a long subulate beak and 2 rows of 1-seeded joints. Plant covered with glandular and branching hairs . . . . . 622. **Chorispora** R. Br.
+ Plant not as above . . . . . 90.
90. Flowers purple, pink, or white . . . . . 91.
+ Flowers yellow . . . . . 95.
624 91. Plant with simple hairs, root thickened, Silique fusiform, spongy inside . . . . . 657. **Raphanus** L. (R. sativus).

+ Plant with branching hairs (sometimes mixed with glandular), silique not as above . . . . 92.

92. Flowers pink or purple . . . . 93.

+ Flowers white . . . . 94.

93. Glandular hairs in pubescence . . . . 625. **Anchonium** DC.

+ Glandular hairs absent . . . . 626. **Trichochiton** Kom.

94. Silique breaking into transverse joints . . . . 613. **Cryptospora** Kar. et Kir.

+ Silique not as above . . . . 618. **Leptaleum** DC.

95. Siliques cylindrical, breaking into transverse joints. Hairs simple. . . . . 657. **Raphanus** L.

+ Hairs branching (or mixed with glandular). Silique not breaking into transverse joints . . . . 96.

96. Silique linear, slightly constricted between seeds, terminating abruptly into a style . . . . 623. **Sterigmostemum** M. B.

+ Silicle gradually tapering above, not constricted between seeds . . . . 625. **Anchonium** DC.

97. Plants glabrous or simple-hairy, sometimes with admixture of glandular hairs . . . . 98.

+ Plants pubescent (even if only in lower part), hairs branching, sometimes with admixture of simple and glandular hairs . . . . 131.

98. Flowers yellow . . . . 99.

+ Flowers pink or white . . . . 111.

99. Seeds more or less globular . . . . 100.

+ Seeds different — flat or elongated . . . . 102.

100. Petals pale yellow with violet nerves . . . . . . 651. **Eruca** Adans.

+ Petals yellow, without violet nerves . . . . 101.

101. Valves with 3—5 subequal nerves. Beak flattened, 2-edged . . . . 650. **Sinapis** L.

+ Valves with 1 midrib and a network of thinner lateral veins. Beak cylindrical . . . . 649. **Brassica** L.

102. Seeds biseriate in each cell . . . . 103.

+ Seeds uniseriate in each cell . . . . 104.

625 103. Midrib on valves absent or inconspicuous . . . . . 587. **Roripa** Scop.

+ Midrib conspicuous . . . . 648. **Diplotaxis** DC.

104. Plants completely glabrous . . . . 105.

+ Plants simple-hairy . . . . 108.

105. Cauline leaves entire, sessile, amplexicaul. Annuals, glabrous and glaucous . . . . 658. **Conringia** Adans.

+ Plants not as above . . . . 106.

106. Siliques short, oval-tetragonous, with membranous valves . . . . 566. **Taphrospermum** C. A. M.

+ Siliques long, linear, with coarse valves . . . . 107.

107. Siliques flattened, laterally plane, with slightly prominent midrib . . . . 594. **Arabis** L.

+ Siliques subtetragonous, valves keeled, prominently nerved . . . . 586. **Barbarea** R. Br. (see also 569, Sisymbrium L.).

108. Silique short, linear-lanceolate, flattened . . . 630. **Christolea** Camb.

+ Silique elongated, linear or cylindrical . . . . 109.

109. Valves with thin inconspicuous midrib. Siliques undulate, constricted between seeds . . . . 578. **Cymatocarpus** Schulz.
+ Valves with conspicuous midrib. Siliques not constricted . . . . 110.
110. Valves with thick rib. Beak conical, with seed at base. Seeds reticulate-rugose . . . . 652. **Hirschfeldia** Moench.
+ Valves with thin midrib. Seeds smooth . . . . . 569. **Sisymbrium** L.
111. Silique with flat horn at apex . . . . 661. **Andrzeiovskia** Rchb.
+ Silique not as above . . . . 112.
112. Plants glabrous . . . . 113.
+ Plants simple-hairy, sometimes with admixture of glandular hairs . . . . 125.
113. Perennials . . . . 114.
+ Annuals (rarely biennials) . . . . 122.
114. Petals white . . . . 115.
+ Petals pink . . . . 119.
115. Cauline leaves pinnate . . . . 116.
+ Cauline leaves entire . . . . 117.
626 116. Petals notched at apex. Valves prominently nerved. Caucasus . . . . 570. **Phryne** Bub.
+ Petals entire, valves nerveless at outer side . . . . 589. **Nasturtium** R. Br.
117. Siliques flattened, broad, on a thin gynophore . . . . 564. **Macropodium** R. Br.
+ Siliques without gynophores . . . . 118.
118. Siliques tetragonous, keeled at the back, leaves cordate . . . . 567. **Eutrema** R. Br.
+ Siliques flattened, with obscure midrib . . . . 594. **Arabis** L.
119. Leaves pinnate . . . . 591. **Cardamine** L. (see also 594, Arabis L.).
+ Leaves simple . . . . 120.
120. Siliques flattened, broad, on long gynophores . . . . 564. **Macropodium** R. Br.
+ Siliques without gynophores . . . . 121.
121. Plants up to 50 cm tall, with thick, tuberlike root and reniform-cordate lower leaves . . . . 660. **Chalcanthus** Boiss.
+ Plants smaller, with thin root, lower leaves different. Cauline leaves sagittate, sessile . . . . 612. **Malcolmia** (L.) R. Br. (M. meyeri) (see also 594. Arabis L.).
122. Valves detached from septum, flexibly convolute. Leaves pinnate . . . . 591. **Cardamine** L.
+ Valves not as above . . . . 123.
123. Petals purple, large (15–25 mm). Siliques flattened, broad . . . . 659. **Spryginia** M. Pop.
+ Petals yellowish, white or pink, smaller, siliques narrowly linear . . . . 124.
124. Petals yellowish. Siliques 30–90 mm long . . . 658. **Conringia** Adans.
+ Siliques 12–16 mm long, petals pink or white . . . . 576. **Thellungiella** Schulz.
125. Plants with simple and glandular hairs. . . . 609. **Clausia** Korn.-Tr.
+ Plants with simple hairs only . . . . 126.

126. Leaves pinnate . . . . 591. **Cardamine** L.
+ Leaves entire . . . . 127.
627 127. Siliques broad, flattened on long, slender stalks . . . . 564. **Macropodium** R. Br.
+ Siliques without stalks . . . . 128.
128. Valves without distinct midrib, siliques flattened . . . . 129.
+ Siliques tetragonous, keeled . . . . 565. **Alliaria** Scop.
129. Rootstock leaves fleshy, squamose, valves flexible, convolute when detached from septum . . . . 590. **Dentaria** L.
+ All leaves petiolate, valves not convoluting . . . . 130.
130. Siliques aseptate . . . . 572. **Aphragmus** Andrz.
+ Silique septate, bilocular . . . . 610. **Parrya** R. Br.
131 (97). Pubescence of branching, glandular hairs or conical papillae . . . . 132.
+ Pubescence of branching hairs only . . . . 137.
132. Siliques moniliform, constricted between seeds, cylindrical, short (up to 20–21 mm) . . . . 574. **Torularia** Schulz.
+ Siliques not moniliform . . . . 133.
133. Petals 2–7 mm long . . . . 620. **Dontostemon** Andrz.
+ Petals larger . . . . 134.
134. Stigma with 2 flat adjacent lobes . . . . 608. **Hesperis** L.
+ Stigma-lobes not adjacent . . . . 135.
135. Siliques erect, long . . . . 136.
+ Siliques pendulous, short . . . . 615. **Microstigma** Trautv.
136. Siliques 5–15 cm long . . . . 614. **Matthiola** R. Br.
+ Siliques shorter . . . . 624. **Iskandera** N. Busch.
137. Siliques 4-horned . . . . 616. **Tetracme** Bge.
+ Siliques not as above . . . . 138.
138. Seeds biseriate in each cell . . . . 139.
+ Seeds uniseriate in each cell . . . . 144.
139. Silique short, oval-oblong, inflated, terminating at apex with a short, fleshy style. Petals small (up to 3–5 mm) . . . . 140.
+ Silique elongated, not as above . . . . 142.
140. Leaves entire . . . . 141.
+ Leaves pinnatipartite into pinnatifid segments . . . 669. **Hedinia** Ostenf.
628 141. Leaves sagittate, sessile. Petals 1–1.2 mm long . . . . 580. **Chrysochamela** Boiss.
+ Leaves petiolate. Petals larger . . . . 575. **Braya** Sternb. et Hoppe.
142. Petals pink or purple . . . . 610. **Parrya** R. Br.
+ Petals yellow . . . . 143.
143. Leaves petiolate, plant densely pubescent . . . 585. **Syrenia** Andrz.
+ Leaves sessile, sagittate at base; plant pubescent only in lower part . . . . 593. **Turritis** L.
144. Siliques short, oblong-oval, broad . . . . 145.
+ Siliques long, thin, linear or cylindrical . . . . 146.
145. Leaves pinnatisect, seeds wingless . . . . 582. **Smelovskia** C. A. M.
+ Leaves entire, seeds flattened, winged . . . . 632. **Cithareloma** Bge.
146. Siliques cylindrical, moniliform, undulate-torulose (elevated around seeds) . . . . 147.
+ Siliques long, tetragonous or cylindrical, not moniliform . . . . 149.

147. Valves with distinct midrib . . . . 148.
+ Valves without midrib . . . . 595. **Stevenia** Adams et Fisch.
148. Inner sepals saccate at base . . . . 573. **Maresia** Pomel.
+ All sepals equal, not saccate at base . . . . 574. **Torularia** Schulz.
149. Cauline leaves sessile, seldom sagittate or if completely absent, then all leaves radical . . . . 150.
+ Cauline leaves petiolate . . . . 151.
150. Flowers white . . . . 577. **Arabidopsis** Heynh.
+ Flowers pink-purple . . . . 612. **Malcolmia** (L.) R. Br. (M. grandiflora).
151. Silique somewhat spirally twisted. Flowers white . . . . 619. **Streptoloma** Bge.
+ Silique straight . . . . 152.
152. Petals minute (ca. 1 mm long). Flowers white. Leaves linear. Small annual plant from the mountains of Central Asia . . . . 611. **Atelanthera** Hook. f. et Thoms.
629 + Plant not as above . . . . 153.
153. Hairs appressed . . . . 584. **Erysimum** L.
+ Hairs spreading . . . . 154.
154. Leaves 2–3-pinnatisect . . . . 579. **Descurainia** Webb et Berth.
+ Leaves entire . . . . 155.
155. Plants pulvinate. Transbaikalia . . . . . . 596. **Borodinia** N. Busch.
+ Plants not pulvinate . . . . 594. **Arabis** L.

DIAGNOSES PLANTARUM NOVARUM IN TOMO VIII FLORAE URSS COMMEMORATARUM

ADDENDA VII*

(DIAGNOSES OF NEW SPECIES MENTIONED IN VOLUME VIII)

Martio 1939

633 CLEOME L.

1. **C. turkmena** Bobr. sp. nova (Sect. *Cleomopsis* Bobr. sect. nova. — Stamina sex circum gynophorum basi coalita apice libera, capsula siliquosa, folia simplicia).

Annua, caules 20—50 cm alti, juveniles cinereo-virides, adulti fusco-rubri, a basi ramosi, praesertim juveniles floccoso-lanati; folia inferiora orbiculata, 2—3 cm longa, petiolis ad 1.5 cm lg., media ovata petiolis brevioribus; folia et petioli subtus albo-lanati. Flores in parte superiore caulis laxe dispositi, pedicellis ad 1 cm lg.; inflorescentia in fructificatione valde laxa; sepala ca. 3 mm lg. lanceolata extus villosa, petala 6—7 mm lg. obovata vel oblanceolata extus villosa; filamenta circum gynophorum basi coalita, demum elongata, petala excedentia; capsulae siliquae formes 3—4 cm lg., 2—3 mm lt., subcurvatae, longitudinaliter sulcatae, a latere moniliformes, juveniles floccoso-lanatae, glandulosulae, pedicellis reclinatis rubescentibus, ad 1 cm lg., semina fusca, ca. 2 mm diam., pilis sparsis tecta.

Hab.: in gypsaceis.

Typus: in valle fluminis Sumbar, prope Kara-kala Turcomaniae occidentalis, 10 XI 1934 leg. M. G. Popov; in herb. Ac. Sc. URSS conservatur.

Planta *C. Gordjagini* M. Pop. affinis, a qua inflorescentia laxa elongata, floribus minoribus, gynophoro breviore, pedicellis capsularum dimidio brevioribus, capsulis latioribus, sat differt.

2. **C. rostrata** Bobr. sp. nova (Sect. *Thyllacophora* Franch.).

Caules 15—40 cm alti, fusci, in parte media ramosissimi, inferne pilis longis (ad 8 mm) albis recedentibus dense tecti; folia inferiora cordata, apice acuminata, ad 2.5 cm long., 2 cm lt., petiolis ca. 2 cm long., subtus quinquenervia, dense pilosa, supra flavo-viridia sparse longipilosa, folia media ovata, breviter petiolata, acuminata, trinervia, superiora (bracteae) sessilia, subulata, ad 0.6 cm long. Inflorescentia apice densa in fructificatione laxa; flores ca. 5 mm longi, breviter pedicellati, sepalis elongatis acuminatis, pilosis, ca. 5 mm long., petalis tenuibus, flavidis, elongato-lanceolatis dorso margineque ciliolatis intus inferne squamulis praeditis; staminibus 4 serius ad 10 mm prolongatis; pedicellus capsulae 0.5—0.7 cm longus pilosus, capsula rostriformis, attenuato-acuminata, ca. 1 cm long., inferne 5—6 mm lat., valvis scabridis tuberculatis

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* [This appendix has been reproduced photographically from the Russian original.]

634 glandulis luteis stipitatis obsitis, apice dehiscentibus, seminibus argillaceis ca. 1 mm diametro.

Hab.: in lapidosis rivi.

Typus: Asia Media, Pamiro-Alaj occidentalis inter pagos Kzyl-su et Saraj-Komar 6 X 1929 leg. N. Russanov; in herb. Ac. Sc. URSS conservatur.

Species *C. Lipskyi* affinis, sed caulibus magis ramosis longipilosis, foliis inferioribus cordatis, capsulis duplo-triplo minoribus, breviter pedicellatis diversa.

EUTREMA R. BR.

3. **E. pseudocordifolium** M. Pop. sp. nova.

Perenne, glaberrimum, rhizoma crassum, abbreviatum, fibris radicalibus crassis longis, apice ad collum residuis petiolorum emortuorum fibrosis vestitum; caulis 50—80 cm altus, cylindricus, erectus, superne patentim ramosus; foliorum radicalium lamina profunde cordata, ampla (10×10 cm), obtusissima, margine obsolete rotundato-crenata, petiolo lamina longiore, folia caulina inferiora 1—3 radicalibus similia, cordata, brevius petiolata, summa 1—2 minora, ovata, basi attenuata; racemi sub anthesi corymbosi, serius elongati, laxi, pedicelli tenues, graciles, patentissimi, usque ad 20 mm lg.; sepala hyalina, oblonga, ca. 3 mm lg.; petala ca. 6 mm lg., obovata alba; siliquae (juniores tantum notae) usque ad 20 mm lg., erectae, tenuiter fusiformes, glaberrimae, 3—4-spermae, stylo brevi cylindrico instructae, stigma truncatum integrum.

Area geogr.: Asia Media, Tianschan orientalis.

Typus: montes Alatau transilienses, in angustiis Talgar supra custodiam, in rupibus graniticis. 25 V 1936 fl. fr. imm. Leg. M. Popov; in herb. Ac. Sc. URSS conservatur.

Ab *E. alpestri* optime differt foliis amplis profunde cordatis, floribus $1^{1}/_{2}$-plo majoribus, siliquis duplo longioribus, ab *E. cordifolio* sajanensi siliquis longis foliisque obsoletissime crenatis, nec non floribus majoribus distinctum.

SISYMBRIUM L.

4. **S. brachycarpum** (N. Busch) Vass. sp. nova. — *S. erucastrifolium* Rupr. f. *brachycarpa* N. Busch Fl. cauc. crit. III, 4 (1908) 213.

Annuum, 30—75 cm altum, pilis rigidis patulis praecipue in parte inferiore obsitum; folia oblonga, pinnatisecta, lobo terminali triangulari-oblongo, lobis lateralibus aequalibus, dentatis. Sepala ca. 2.5—3 mm lg.; petala 5—6 mm lg., lutea; pedicelli tenues, (5) 8—10 mm lg.; siliquae glabrae, 20—35 mm lg., ca. 0.75 mm lt., stylus ca. 1 mm lg.; semina oblonga, brunnea, 1 mm lg., 0.5 mm lt.

635 Area geogr.: Caucasus Magnus, regio silvatica et stepposo-silvatica, in decliviis siccis et ad vias.

Typus: inter Sagada et Kuaini in Daghestania. 21 VII 1904, N. A. Busch, iter caucasicum VII; in herb. Ac. Sc. URSS conservatur.

S. erucastrifolio (Rupr.) Trautv. affine, a quo siliquis brevioribus differt.

5. **S. isfarense** Vass. sp. nova. — *S. subspinescens* (F. et M.) Bge. var. *kokanicum* M. Поп. в Растит. Ферг., Тр. Турк. Гос. Унив. IV (1922) 50.

Perenne, 25—40 cm altum, ramosissimum; folia parva, 1.5—3 cm lg. (excl. petiolo), oblonga vel oblongo-obovata, obtuse-remote-dentata vel inferiora lobata, superiora integerrima. Sepala flavescentia, 6—7 (8) mm lg.; petala 8—10 (12) mm lg., 1.5—2 mm lt., ad basin angustata, linearia; pedicelli 6—8 (10) mm lg., siliquis subaequicrassi, patentes; siliquae lineares, 50—70 mm lg., ca. 1—1.2 mm lt., glabrae; stigma crassum, capitatum; semina 2—2.5 mm lg., 0.8 mm lt., oblongo-linearia, brunneoflavescentia, apice acuta membranacea.

Area geogr.: Asia Media (Fergana), in decliviis calcareis.

Typus: prope oppidum Konibodom, in stratu gypsaceo puro inter colles rubros prope petroleas „Santo", 19 IV 1923. Leg. Popov et Vvedensky; in herb. Ac. Sc. URSS conservatur.

S. subspinescenti (Fisch. et Mey.) Bge. affine, a quo foliis et petalis minoribus et area differt.

6. **S. daghestanicum** Vass. sp. nova.

Annuum, 40—60 cm altum, pilis rigidis patulis pubescens; folia inferiora runcinato-pinnatisecta, lobis lateralibus lineari-lanceolatis, dentatis, recurvatis, terminali magno, oblongo-triangulari; folia superiora lobis lateralibus linearibus recurvis. Sepala lanceolata, pilosa, 3—4 mm lg.; petala flavescentia (in sicco!), 6—8 (10) mm lg., pedicelli fructiferi 5—7 mm lg., pilis sparsis obsiti; siliquae rectae glabrae, 60—80 mm lg., 1.5—1.8 mm lt.; stylus ca. 2 mm lg., stigma parvum, capitatum, bilobum; semina ca. 1 mm lg., 0.5—0.6 mm lt., rufescentia, lateraliter convexa.

Area geogr.: Caucasus, Daghestania.

Typus: Daghestania, prope Derbent, in ruderatis. 1870, leg. Becker, n° 221 sub *S. columnae* Jacq. var. *leiocarpa* DC; in herb. Ac. Sc. URSS conservatur.

A *Sisymbrio orientali* siliquis nudis et latioribus differt.

TORULARIA O. E. SCHULZ

7. **T. brachycarpa** Vass. sp. nova.

Planta perennis, caules 2—8 cm alti, ramosissimi, ramis tenuibus, foliosis, rubris, pilis bifurcatis vestitis. Folia oblonga, numerosa, inferiora 1.5—

636 2 cm longa, caulina 0.7—1 cm longa, pinnatifida, lobis lanceolatis. Racemus densus bracteatus. Sepala pilosa, elliptica, 1.2—1.5 mm longa. Siliquae lineari-cylindricae, crassae, 6—8 mm longae, 1—1.2 mm latae, dense pilosae, stylo crasso, subnullo, pedicelli pilosi, tenues, 2—3 mm longi.

Hab.: in vallibus lapidosis Pamiricis usque 3500—4000 m s. m.

Typus: Pamir, prope fl. Aк-baital, confl. Murgab, alt. ca. 3900 m, 7 VII 1901. Leg. Alexeenko, n° 2391; in herb. Ac. Sc. URSS conservatur.

T. humili (C. A. M.) Schulz affinis, a qua siliquis petalisque brevioribus differt.

BRAYA STERNB. et HOPPE

8. **B. brachycarpa** Vass. sp. nova.

Perennis, 5—6 cm alta; caules numerosi, dense pilosi; folia numerosa, omnia radicalia, linearia, subglabra, pilis brevibus basi obsita. Racemi breves, capitati, densi; sepala 2.5—8 mm lg., lucida; petala elliptica, 2.5—3 mm lg.; siliquae numerosae, ovato-globulosae, 2—2.5 mm lg., glabrae vel subglabrae, ca. 2 mm lt., stylo crassiusculo, 0.5 mm lg.; stigma parvum.

Area geogr.: Asia Media, Pamir.

Typus: ad ripas sabulosas fluvii Muskol M. I. Tulinov, 1901, Pl. Pamiricae, n° 9 sub *B. rosea* Bge.; in herb. Ac. Sc. URSS conservatur.

A *B. Scharnhorstii* Rgl. siliculis subglobosis differt.

9. **B. angustifolia** (N. Busch) Vass. sp. nova. — *B. rosea* var. *angustifolia* N. Busch in Fl. Sib. et Or. Extr. VI (1931), 583.

Perennis, 2—5 cm alta, caules numerosi, rubelli, sparse pilosi; folia numerosa, omnia radicalia, anguste linearia, subfiliformia, in sicco subcapillaria, margine parce dentata. Racemi breves, capitati; pedicelli fructiferi 2—3 mm lg.; siliquae oblongae, 3—4 (5) mm lg., 1.2—1.5 mm lt., stylo brevi.

Area geogr.: Sibiria Orientalis.

Typus: distr. Tunka montium Sajanensium, in decliviis lapidosis, 28 V 1902. V. Komarov; in herb. Ac. Sc. URSS conservatur.

A *B. rosea* (Turcz.) Bge. foliis angustissimis subfiliformibus differt.

CHRISTOLEA CAMBESS.

10. **Ch. linearis** N. Busch sp. nova.

Perennis, tota cum siliquis molliter villosa pilis longis albis; rhizoma simplex vel ramosum, residuis foliorum emortuorum vetustorum vestitum; folia omnia rosulata, late obovata, antice crenata, in petiolum brevem ac latum angustata. Scapi 5—10 cm alti, multiflori, floribus a basi obsessi; flores parvi, sepala ovata, 2.5—3 mm lg., obscure violacea, margine membranacea; petala 5—5.5 mm lg., atroviolacea obovata, unguiculata; pedicelli

637 fructiferi 2—5 mm lg.; racemus secundus, siliquae lineares, 20—35 mm longae, 2 mm latae, valvulae nervo medio sat manifesto; stylus latus ac brevissimus, usque ad 0.5 mm lg., stigma bilobum; semina flava, 1.5—1.7 mm lg., 1—1.25 mm lt., aptera; embryo pleurorhizus.

Area geogr.: Asia Media, Pamiro-Alai. Endem.

Typus: Schugnan, fontes fluvii Abchary, in schistosis. 2 VIII 1904 fr. B. Fedtschenko; in herb. Ac. Sc. URSS conservatur.

A caeteris speciebus *Christoleae* generis floribus parvis, racemis secundis, siliquis linearibus bene differt.

ERYSIMUM (TOURN.) L.

11. **E. chazarjurti** N. Busch sp. nova.

Bienne, caules aliquot 20—35 cm alti, angulatostriati, pilis malpighiaceis pubescentes; folia oblongo-lanceolata, pilis malpighiaceis et trifidis vestita. Sepala oblonga, 7—10 mm lg., albo-membranaceo-marginata, extus pilis ramosis minutissimis sparse obtecta; petala lutea, oblongo-obovata, longiunguiculata, 13—16 mm lg., 3—3.5 mm lt.; pedicelli fructiferi 5—6 mm lg., pilis malpighiaceis et trifidis pubescentes; siliquae rectae, tenues, tetragonae, pilis ramosis minutis pubescentes, 20—35 mm lg., 1 mm lt.

Area geogr.: Transcaucasia meridionalis.

Typus: respublica Nachiczevan, prope pag. Nasyrvad, mons Chazarjurt. Karjagin. Karabach meridionalis, in decliv. boreali montis Ziarat, prata subalpina, 2200—2300 m leg. Karjagin et Mikulin; in herb. Ac. Sc. URSS conservatur.

Habitu *E. Marschallianum* Andrz. referens, sed pubescentia *E. caspicum* N. Busch.

12. **E. epikeimenum** N. Busch sp. nova.

Bienne, caules aliquot vel unicus, 40—60 cm alti, subangulati, graciles, superne saepe ramosi, cum foliis pilis malpighiaceis pubescentes, folia radicalia lineari-lanceolata, petiolata, caulina angustiora, sessilia, omnia acuta. Sepala 5—6 mm lg., pilis malpighiaceis obtecta, petala 11—12 mm lg., obovata, unguiculata, purpurea; pedicelli fructiferi 5—7 mm lg.; siliquae axi adpressae, 15—22 cm lg., ca. 2 mm lt., ad apicem paulo angustatae, tetragonae, pilis malpighiaceis cum trifidis nonnullis vestitae; stylus tenuis, 2.5—2.75 mm lg., stigma bilobum. — V fl., VI fr.

Area geogr.: Asia Media: Tadshikistania.

Typus: decliv. merid. jugi Zeravschan, Akbi-zerkak 1800 m 9 VI 1913 fr. leg. Michelson. Magian-Marguzar 19 VII 1912, fl. fr. imm. Preobrashensky; in herb. Ac. Sc. URSS conservatur.

Ab *E. strictisiliquo* N. Busch jam primo aspectu caulibus pluribus, foliis angustis et floribus minoribus differt.

13. **E. strictisiliquum** N. Busch sp. nova.

Bienne, caulis simplex, angulato-sulcatus, pilis malpighiaceis pubescens, 30—40 cm altus; folia lanceolata, brevia, ad apicem paulo dilatata et subito acutata, ad basin angustata, folia rosulae petiolata, caulina sessilia, omnia pilis minutis ramosis pubescentia. Flores violacei, petala ca. 14 mm lg., lamina orbiculata, ungue angusto; pedicelli fructiferi 4—5 mm lg., crassiusculi, axi adpressi; siliquae cauli adpressae, tetragonae, ad apicem paulo angustatae, pilis minutissimis ramosis pubescentes, 15—20 mm lg., stylus 2 mm lg., stigma bilobum. VII fr., fl. ultimi.

Area geogr.: Transcaucasia meridionalis.

Typus: Karabach, inter pag. Kyrch et Alty-Tachta. Leg. Doluchanov et Achverdov; in herb. Ac. Sc. URSS conservatur.

Planta habitu proprio ab omnibus speciebus lilacinis generis *Erysimi* diversa, ab *E. epikeimeno* foliis latioribus et floribus majoribus atque area geographica bene differt.

14. **E. humillimum** (Ldb.) N. Busch sp. nova.

Perenne, caespitosum, pluricaule; rhizoma crassum, pluriceps; caules 4—30 cm alti, cum foliis, pedicellis et siliquis dense pilis adpressis malpighiaceis pubescentes; folia radicalia numerosissima, omnia albo-canescentia, angusta, linearia, integerrima. Racemus brevis, deinde elongatus; sepala rubella, 6—8 mm lg., petala lutea, 14—16 mm lg., 5—6 mm lt.; pedicelli fructiferi 4—8 mm lg., interdum crassiusculi, siliquae 3.5—4.5 cm lg., 1.5—2 mm lt., stylus 2—3 mm lg., tenuis, stigma bilobum. VI—VII.

Area geogr.: Regio alpina Sibiriae occidentalis (Altai, Tschuja) et Asiae Mediae (Balchasch, Soongaro-Tarbagatai, Tjan-Schan, Syr-Darja, Pamiro-Alai), Kuldsha.

Typus: in sterilissimis deserti editi ad fl. Tschuja. Leg. A. Bunge; in herb. Ac. Sc. URSS conservatur.

E. altaico affine, sed statura humiliore, pubescentia cana et foliis linearibus integerrimis diversum.

15. **E. argyrocarpum** N. Busch sp. nova.

Suffrutex, totum pilis malpighiaceis canum, pubescentia densissima argenteo-sericea siliquarum mirabili; rhizoma ramosum ramis pluricaulibus; caules humiles, 12—20 cm alti, graciles; folia linearia vel lanceolato-linearia, acutata. Sepala oblonga, pubescentia, ca. 9—10 mm lg.; petala 18—20 mm lg.; pedicelli fructiferi breves, 3—5 mm lg., erecto-patuli; siliquae complanato-tetragonae, 2.5—4 cm lg., stylus longus, 3—4 mm lg., stigma breviter bilobum; semina brunnea, oblonga, ca. 2.5 mm lg., ca 0.5 mm lt.

Area geogr.: Caucasus: Talysch.

639 Typus: Talysch, in saxosis et lapidosis Geladara in Suvant, 13 VII 1931 fl. fr. Matveeva. Schona-tschola 7 VI 1935 fr. Gurvicz; in herb. Ac. Sc. URSS conservatur.

Species pulchra, praesertim siliquis sericeo-canis et stylo 3—4-plo longiore ab *E. brevistylo* bene differt.

16. **E. caspicum** N. Busch sp. nova.

Perenne, canescens propter pilos malpighiaceos densos; in foliis pilis malpighiaceis pili trifidi sparsi intermixti sunt; caules graciles, 30—40 cm alti, recti vel arcuati; folia oblanceolato-linearia, apice acutata. Racemi longi, flores mediocres, sepala propter pilos ramosos canescentia, ca. 6 mm lg., oblonga, margine membranacea; petala lutea, obovato-spathulata, ca. 11 mm lg., lamina ca. 3.5 mm lt., ungue longo et angusto; pedicelli fructiferi crassiusculi, ca. 2 mm lg.; siliquae 18—22 mm lg., subtetragonae, pilis 3—4—5-partitis canescentes, stylus ca. 1.5 mm lg., stigma bilobum.

Area geogr.: Caucasus, pars orientalis (distr. Kuba).

Typus: Azerbaidzhan, distr. Chizu (olim Kuba), prope Alty-agacz, in monte Schischka. 4 VII 1935, fl. fr. Leg. Gurvicz; in herb. Ac. Sc. URSS conservatur.

Ab affinibus *E. leptophyllo* Andrz. et *E. substrigoso* (Rupr.) N. Busch pubescentia, pedicellis brevibus et crassiusculis et aliis characteribus differt.

17. **E. Francheti** N. Busch sp. nova. — *E. purpureum* var. *turkestanicum* Franchet Miss. Capus Fl. du Turk. (1883) 20. — *E. samarcandicum* M. Pop. in sched. herb.

Perenne, pili caulis et foliorum bipartiti (malpighiacei), siliquarum praesertim tri-quadripartiti, malpighiaceis intermixtis, a collo multicaule, caules graciles, suberecti, 30—50 cm alti; folia radicalia linearia, caulina anguste-lanceolato-linearia. Racemi ad finem anthesis laxi, elongati; sepala oblonga, pilis malpighiaceis obtecta, 8—8.5 mm lg., ad marginem et ad apicem albomembranacea, lateralia saccata; petala violaceo-purpurea, ad finem anthesis pallescentia, interdum autem ochroleuca, ca. 13 mm lg., lamina obovata, ungue longo; pedicelli fructiferi 3—5 mm lg., tenuiusculi, erecto-patentes; siliquae 12—25 mm lg., erecto-patentes, tetragonae, vix compressae, stylo latitudinem siliquae vix superante, ca. 1.5 mm lg., stigma capitato-bifidum.

Area geogr.: Asia Media, Pamiro-Alai, Usbekistania.

Typus: Urmistan 2200 m, Czukalan, leg. Franchet; Ziaddin — Kermin 24 IV 1884 fl. fr. leg. A. Regel; in herb. Ac. Sc. URSS conservatur.

Ab *E. violascente* perennitate, foliis linearibus et siliquis valde brevioribus bene differt.

18. **S. macrocarpa** Vass. sp. nova.

Annua, 40—75 cm alta; caulis erectus, crassus, paulo erubescens, pilis bifurcatis obsitus, a basi ramosus; folia numerosa, late oblonga (usque 0.8—1 cm lt.), apice late rotundata, basi angustata, folia summa minuta, subsessilia, oblongo-linearia. Sepala oblongo-linearia, flavescentia, pilosa, 8—10 mm lg.; petala flava, 15—18 mm lg., 5—7 mm lt.; pedicelli incrassati, 5—8 mm lg.; siliquae oblongae, basi dilatatae, 15—20 mm lg., 3—5 mm lt., valvis rigidis, medio costato-alatis, dense albo-pilosis; stylo 7—9 (10) mm lg., semina ovata, 2—3 mm lg., 1—1.5 mm lt.

Area geogr.: Sibiria occidentalis, Altai, regio lac. Zaissan, in declivíis lapidosis et sabulosis.

Typus: prope oppidum Ustj-Kamenogorsk, in sabulosis Blandy-Kul-Kum V 1911, n° 18, V. Reznitschenko; in herb. Ac. Sc. URSS conservatur.

S. siliculosae (DC.) Andrz. affinis, a qua siliquis majoribus et latioribus, basi dilatatis differt.

CARDAMINE (TOURN.) L.

19. **C. Sachokiana** N. Busch sp. nova.

Perennis, subglabra, ad margines foliorum setulae vix conspicuae brevissimae solum adsunt; caulis pumilus, floriferus 6—10 cm altus, folia fere omnia radicalia, caulina solum 1—2, radicalia rosulata, longipetiolata, integra, lamina obovata vel orbiculato-rhombea, integerrima vel utrinque dentibus obtusis 1—2 instructa, folia caulina sessilia, oblonga, obtusiuscula. Racemus floriferus brevis, sepala ovata, albo-membranaceo-marginata, 2—2.5 mm lg.; petala lilacina vel basi alba, vel tota alba, 4—5 mm lg., obovata; ovarium longum, stigma capitatum. Siliqua...

Area geogr.: in schistosis calcareis. Caucasus: Transcaucasia occidentalis.

Typus: Abchasia, mons Arabica. Leg. M. Sachokia 30 VIII 1934 fl.; in herb. Ac. Sc. URSS conservatur.

Species endemica montium calcareorum Abchasiae habitu proprio, *C. Seidlitzianae* Alb. solum affinis esse videtur.

ARABIS L.

20. **A. bucharica** (Lipsky) N. Busch comb. nova. — *A. tibetica* et var. *bucharica* Lipsky in A. H. P. XVIII, I (1900) 4.

Biennis, pubescentia ramosa canescens; caulis erectus, ramosus, vel caules multi, ramis decumbentibus, terrae adjacentibus; folia radicalia rosu-

641 lata, parum vel profunde pinnatifida vel runcinato-lyrata, eadem generis *Crepis* referentia, caulina aut radicalibus similia, aut linearia, integerrima, forma et magnitudine valde variabilia. Sepala 2.5—3 mm lg., dorso pubescentia; petala lilacina, rarissime alba, 4—5 mm lg.; pedicelli fructiferi graciles, 8—22 mm lg., erecto-patentes; siliquae graciles, pendulae, saepe flexuosae, subtetragonae, 3—7 cm lg., valvulae nervo medio manifesto; stylus 1—2 mm lg.; semina brunnea, elliptica, parva, 1—1.2 mm lg., 0.75 mm lt.

Area geogr.: in schistosis, glareosis et lapidosis Asiae Mediae, Pamiro-Alai.

Typus: Hissar, Schachrisjabs, Jaccong. Lipsky. Zeravschan, Murapass. 2600 m 23 V 1892 fl. fr. Komarov; in herb. Ac. Sc. URSS conservatur.

Specimina foliis pinnatifidis *A. arenosam* Scop. referunt.

21. **A. dolichothrix** N. Busch sp. nova. — *A. albida* var. *dolichothrix* N. Busch in Monit. Jard. Tiflis, VI (1906) 19 et in Fl. cauc. crit. III, 4 (1909) 495.

Perennis, pilis longis patentibus in caule et ad petiolos foliorum inferiorum et minus longis pilis laminarum et racemi canum; caulis simplex vel parum ramosus, folia radicalia obovato-oblonga, obtusa, in petiolum brevem angustata, caulina ovalia vel oblonga, sessilia cordato-amplexicaulia, omnia parce dentata. Petala alba obovata abrupte in unguem attenuata; pedicelli fructiferi patuli; siliquae lineares, planae, torulosae, erecto-patentes; semina obscure-brunnea, orbiculata, anguste-marginata.

Area geogr.: Caucasus orientalis.

Typus: ad rupes prope Schemacha 9 IV 1856 fl. defl. V 1861 fl. fr. imm. Bayern; prope Sulut 7—9 V 1908 fl. fr. Schelkovn. et Woronow; in herb. Ac. Sc. URSS conservatur.

Ab *A. caucasica* Willd. praesertim pubescentia propria bene differt.

CLAUSIA KORN.-TR.

22. **C. papillosa** Vass. sp. nova.

Annua, 5—8 cm alta, pilis longis albis et brevioribus rigidis conicis, saepe fere mamillaribus pubescens; folia radicalia oblonga, petiolata, sinuato-dentata. Racemus pauciflorus, sepala 7—9 mm lg., dense pilosa; petala 14—17 mm lg., apice dilatata, usque ad 3.5—4.5 mm lg., rotundata. Pedicelli incrassati, 2—3 mm lg., apice angustati; siliquae tetragonae, vix compressae, pilis brevibus membranaceis, saepe mamillaribus dense obtectae, 20—30 mm lg., ca. 2 mm lt., stylo acuto, 3—4 mm lg.

Area geogr.: Asia Media, in decliviis lapidosis.

Typus: montes Kara-tau, vallis Ak-kuz. 25 V 1930. Leg. Lipschitz, n° 330; in herb. Ac. Sc. URSS conservatur.

A caeteris speciebus *Clausiae* generis siliquis pilis membranaceis, saepe mamillaribus dense obtectis differt.

23. **S. deserti** N. Busch sp. nova.

Annua, humilis, praeter calycem et pedicellos glaberrima, a basi ramosa; folia integerrima, oblonga, caulina basi cordata, amplexicaulia. Pedicelli et sepala pilis sparsis simplicibus pubescentes, sepala oblonga, ca. 3 mm lg., petala lutea, 4—4.5 mm lg., pedicelli fructiferi tenuissimi, reflexi, 8—9 mm lg., siliculae glaberrimae rotundato-ovatae, ca. 12 mm lg., ca. 10 mm lt., loculo inflato carinato, ala manifeste radiatim venosa, ca. 3 mm lt., stylus 0.5 mm lg.

Area geogr.: in decliviis nudis argillosis Asiae Mediae, Balchasch.

Typus: desertum Betpak-dala occidentale, Kendyrlyk in decliviis. Leg. Boczantzew; in herb. Ac. Sc. URSS conservatur.

A *S. armena* Desv. siliculis glaberrimis et loculo carinato diversa.

24. **S. Litvinovi** N. Busch sp. nova.

Annua, caulis 60—70 cm altus, valde divaricatim ramosus, pubescens, folia pubescentia. Racemi longi, laxi; sepala glabra vel subglabra, oblonga, 2.5—3 mm lg.; petala lutea, anguste-spathulata, unguiculata, apice rotundata, 5—5.5 mm lg.; pedicelli fructiferi 13—25 mm lg., tenuissimi, horizontaliter patentes vel reflexi, pubescentes; siliquae rotundatae, transverse latiores, 13—16 mm lg., 18—20 mm lt., pubescentes, loculo tomentoso, esulcatae, uninerviae.

Area geogr.: in decliviis schistosis Armeniae turcicae.

Typus: Turcia, distr. Kars, in angustiis prope stat. viae ferreae Promeshutocznaja. 1 VII 1914 fl. fr. Leg. Litvinov; in herb. Ac. Sc. URSS conservatur.

S. cardiocarpae Trautv. affinis, sed silicula basi non cordata, loculo non costato neque canaliculato manifeste differt.

25. **S. canaliculata** Vass. sp. nova.

Biennis, 15—30 cm alta, a basi ramosa, ramis rigidis. Siliculae 15(18) mm lg., rotundatae, pubescentes, basi cordatae, apice paulo emarginatae, margine late membranaceae, alis ca. 5 mm lt., rugosis, plicatis, tenuiter venosis, loculo 10 mm lg., 8 mm lt., rigido, dense patule villoso, canaliculo mediano instructo; stylus brevis, recurvus.

Area geogr.: Asia Media septentrionalis, in steppis.

Typus: distr. Turgai, apud fluv. Sary-su, 26 V 1914, H. M. Krascheninnikow, n° 5164; in herb. Ac. Sc. URSS conservatur.

A *S. cardiocarpa* Trautv. siliquis medio canaliculatis non costatis differt.

26. **I. anceps** N. Busch sp. nova.

Perennis, caulis 30—40 cm altus, parte inferiore solum sparse ciliatus, ciliis teneris longis patulis; folia dentibus obtusis paucis vel subintegerrima, pilis simplicibus longis et ramosis brevioribus obtecta, oblongo-spathulata, superiora lineari-lanceolata, omnia basi amplexicaulia, auriculata. Inflorescentia paniculata; sepala albo-pilosa, oblonga, 2.5 mm lg., petala citrina, obovato-oblonga, ca. 3.5—4 mm lg.; pedicelli fructiferi 10—11 mm lg., tenues, apice clavato-incrassati, patuli vel reflexi; siliquae 20—22 mm lg., 10—11 mm lt., late-ellipticae, ad apicem et ad basin angustatae (ancipites), luteolae, interdum undulatae, glaberrimae ala latissima venulosa cinctae, loculo lineari-oblongo, nervo mediano valido percursae.

Area geogr.: in schistoso-lapidosis Caucasi, Transcaucasia meridionalis.

Typus: respublica Nachiczevan. Schach-buz. 2 VI 1934 fl., fr. Leg. Grossheim et Prilipko; in herb. Ac. Sc. URSS conservatur.

Ab affinibus *I. Besseri* Trautv. et *I. psilocarpa* Ldb. siliculis ancipitibus et aliis characteribus manifeste differt.

TAUSCHERIA FISCH.

27. **T. oblonga** Vass. sp. nova.

Annua, 30—40 cm alta, superne ramosa. Siliculae oblongae, ovatae, numerosae, plerumque pendulae, 7—8 (10) mm lg., 3.5—4 (6) mm lt., apice sensim angustatae, rostello lato ac longo, plerumque siliculae aequilongo; cavitas interna siliculae lata et aperta; valva interna siliculae paulo convexa cum costa incrassata media.

Area geogr.: Asia Media australis, in decliviis et agris promontorii.

Typus: prope urbem Samarkand ad fl. Zeravschan 28 IV 1916. Leg. N. N. Androssow; in herb. Ac. Sc. URSS conservatur.

A *T. lasiocarpa* Fisch. siliquis majoribus oblongis rostro erecto et cavitate interna lata et aperta differt.

GOLDBACHIA DC.

28. **G. papulosa** Vass. sp. nova.

Annua, 20—30 cm alta, a basi ramosa; folia caulina oblongo-lanceolata v. lanceolata semiamplexicaulia. Pedicelli fructiferi patentes. Siliquae biloculares, tetragono-cylindricae, dense papulosae, velutinae, apice angustatae, rostro 1.5—2 mm lg. instructae, oblongo-obtuso-rugosae, tuberculatae, 10 (12) mm lg., 2.5 (3) mm lt., adscendentes.

644 Area geogr.: Asia Media, in decliviis argillosis et saxosis promontorii.

Typus: Turcomania, prope urbem Aschchabad 17 V 1911, A. I. Michelson n° 303; in herb. Ac. Sc. URSS conservatur.

A *G. reticulata* (Ktze.) Vass. siliquis dense papulosis et tetragono-cylindricis differt.

29. **G. reticulata** (Ktze.) Vass. sp. nova. — *G. laevigata* (M. B.) DC. *β. ascendens* Boiss. f. *reticulata* Ktze. A. H. P. X (1887) 166.

Annua, a basi ramosa; folia radicalia oblongo-ovata vel oblongo-obovata, caulina lanceolata, semiamplexicaulia. Sepala 2—3 mm lg., anguste lanceolata, pilosa; petala oblonga, vix unguiculata, pallide-rosea, 3.5—5 mm lg.; siliquae biloculares (rarissime uniloculares), oblongo-ovatae, tetragonae, paulo compressae, ad basin dilatatae, apice sensim angustatae, rostro longo, acuto, 2.5—3 mm lg., superficies siliquarum acute tuberculata, transverse rugulosa et tenuiter transverse reticulata; siliquae 8—10 (12) mm lg., 2.5—3 (4) mm lt.

Area geogr.: Asia Media et Caucasus austro-orientalis, in desertis arenosis. Endem.

Typus: prope urb. Aschchabad 1 V 1912. Lipsky n° 1192; in herb. Ac. Sc. URSS conservatur.

A *G. papulosa* Vass. siliquis oblongo-ovatis et transverse reticulatis differt.

PARRYA R. BR.

30. **P. turkestanica** (Korsh.) N. Busch sp. nova. — *P. macrocarpa* var. *turkestanica* Korsh. Fragm. Fl. Turk. (1898) 407.

Perennis, rhizoma crassum v. crassiusculum, apice ramosum, usque ad 50 cm lg., ad 1.5 cm crassum, collo residuis foliorum vetustorum vestito; scapi aphylli, 4—30 cm lg.; folia omnia radicalia, oblongo-lanceolata vel lineari-oblonga, in petiolum latum angustata, fere semper parte superiore laminae pinnatifida vel pinnatipartita, rarissime in parte superiore laminae parce denticulata, folia utrinque plus minus pubescentia, praeterea glandulis pedicellatis obtecta. Racemi 5—10-flori; sepala 5.5—9 mm lg., 3—4 mm lt., albo-membranaceo-marginata; petala purpurea vel rosea, 12—20 mm lg., 5—9 mm lt., cordata vel obovata, apice emarginata; pedicelli fructiferi 6—20 mm lg.; siliquae planae, usque ad apicem et basin angustatae, 3—6.5 cm lg., 5—7 mm lt.; stylus 2—4 mm lg., semina pallide-brunnea, elliptica, late-alata, plana, 4—6 mm lg., 3—4.5 mm (cum ala) lt.

Area geogr.: montes Asiae Mediae et Sibiriae orientalis.

Typus: in lapidosis et glareosis regionis alpinae Alatau Soongorici (Aral-dshol); montes Alai, Tengiz-bai 3200 m 19 VI 1895 fr. Korshinsky; in herb. Ac. Sc. URSS conservatur.

645 *Parryae nudicauli* arcticae affinis, sed foliis pubescentibus et area geographica praesertim diversa.

31. **P. runcinata** (Rgl. et Schmalh.) N. Busch sp. nova. — *P. fruticulosa* var. *runcinata* Rgl. et Schmalh. in E. Rgl. A. H. P. V (1877) 237.

Fruticulus subglaber, ad petiolos, rarius ad laminas interdum pili simplices adsunt; caulis ramosus, ramis apice caudiculos annuos parte inferiore foliosos gerentibus; folia oblonga vel obovato-oblonga, plus minus eroso-dentata vel runcinato-pinnatifida, petiolata, apice obtusa vel breviter acuminata. Racemus pauci-usque ad 5-florus; sepala 9—11 mm lg., oblonga, plus minus lilacino-colorata; petala lilacina, obovato-oblonga, apice rotundata vel solum vix emarginata, unguiculata, 25—30 mm lg., ungue calycem superante; pedicelli fructiferi 9—16 mm lg.; siliquae lineares, 5—6 cm lg.; stylus 3.5—4 mm longus, stigma bilobum.

Area geogr.: ad rupes et declivia lapidosa Asiae Mediae, 1900—3300 m.

Typus: Zeravschan, jugum Kadshara 3000 m 20 VI 1870 fl. Leg. O. Fedtschenko; in herb. Ac. Sc. URSS conservatur.

A P. pinnatifida subglabritie, a *P. fruticulosa* stylo longo, foliorum forma, petalorum unguibus calycem superantibus bene differt.

32. **P. subsiliquosa** M. Pop. sp. nova.

Perennis, praeter pilos sparsissimos capitato-glandulosos glabra; rhizoma 1—3-cephalum apice squamatum; caulis 30—60 cm altus, erectus, subcylindricus, simplex, parte inferiore solum foliatus; folia radicalia longipetiolata, petiolo planiusculo laminae aequilongo vel ea longiore, lamina oblonga, lyrato-pinnatilobata, lobis paucis triangularibus acutis vel ovatis, obtusis, terminali majore subobtuso vel acuto, interdum lamina subintegra, paucidenticulata; folia caulina 1—3, radicalibus similia, sed sessilia et fere integra, acuta, summa (infra medium caulem) interdum sublinearia. Racemus simplex pauciflorus, laxus; pedicelli pilis glanduloso-stipitatis tecti, 5—10 mm lg., fructiferi crassi, ad 20 mm lg.; calyx purpureus, angustus, ca. 10 mm lg., pilis glanduloso-stipitatis adspersus, sepala lineari-oblonga, petala violacea, 20 mm lg., lamina obovata, vix emarginata vel retusa, ungui aequilonga; siliquae erecto-patentes, 10—13 cm lg., planae, lineares, ca. 3 mm lt.; juniores glanduloso-punctatae, adultae glabrae, valvis nervo medio prominente venulisque submanifestis reticulatis, apice in rostrum 4—7 mm lg. cylindricum subito abeuntes; stigma lobis erectis longis contiguis; semina plana ovalia, latiuscule alata, 3 mm lg.

Area geogr.: Asia Media, Tjan-Schan orientalis.

Typus: in montibus Alatau transiliensibus, ad fluvium Almatinka Minorem; infra Medeo, ad rupes graniticas, ca. 1600 m. VI 1935 fl. et 18 VI 1933 fr., atque ad fl. Talgar 25 V 1936 fl. Leg. Popov; in herb. Ac. Sc. URSS conservatur.

646 A *P. siliquosa* Krassn. (e montibus Tschu-iliensibus) differt habitu robusto, petalis duplo majoribus et latioribus, siliquis latioribus et fere duplo longioribus, pilis glandulosis sparsissimis.

33. **P. stenophylla** M. Pop. sp. nova.

Perennis, praeter pilos sparsos longos tenuissimos ad calycem, pedicellos et interdum scapos, glabra, viridis; rhizoma ramosissimum, ramis elongatis subcaespitosis tenuibus lignescenti-induratis; folia omnia radicalia, ex parte integra, anguste-linearia, ex parte pinnatipartita segmentis lateralibus linearibus, pectinatis, paucis, segmento terminali longo lineari. Scapi erecti tenues folia paulo superantes, 5—12 cm alti; racemi pauciflori, laxi; pedicelli 5—20 mm lg.; calyx purpureus, angustus, ca. 10 mm lg., sepalis oblongis, obtusis; petala violacea pulcherrima, 20—25 mm lg., laminis obcordatis, ungui aequilongis; siliquae anguste lineares, ca. 2 mm lt., erectae, 5—10 cm lg., in stylum longiusculum sensim attenuatae.

Area geogr.: Asia Media, Tjan-Schan orientalis.

Typus: montes Alatau transilienses, fontes fl. Almatinka Minoris, ad glaciem Tjuk-su, in glareosis. 7 VII 1936 fl. Leg. M. Popov; in herb. Ac. Sc. URSS conservatur.

Species pulcherrima, foliis angustissimis diversis: intergis et pinnatisectis lobis anguste linearibus, siliquisque angustis insignis.

34. **P. ajanensis** N. Busch sp. nova.

Perennis, glaberrima, radix crassa, pluriceps, 5—13 mm diametro; scapi aphylli, folia omnia rosulata, petiolata, late-lanceolata, apice acutata, integerrima v. dentata, cum petiolo 7—16 cm lg., petioli ad 1.5—10 cm lg. Pedicelli fructiferi 12—25 mm lg., erecto-patentes; siliquae planae, 4.5—6 cm lg., 5—6 mm lt., inter semina strangulatae, gynophoro brevi insidentes, valvae uninerviae et venis minus manifestis lateralibus anastomosantibus percursae, stylus 4—6 mm lg., semina ala magna alba membranacea instructa, ala apice magis evoluta, cum ala 7—7.5 mm lg., 3.5—5 mm lt.

Area geogr: Oriens Extremus, Ochotia.

Typus: Ajan, pratum paludosum ad riv. Sivakcza. Leg. Vassiljev; in herb. Ac. Sc. URSS conservatur.

P. nudicauli (L.) Rgl. proxima, sed statura major, stylus longior, semina majora.

35. **P. pulvinata** M. Pop. sp. nova.

Perennis, pumila, glaberrima, glaucescens, 4—11 cm alta; rhizoma crassum, pluriceps, apice residuis foliorum vetustorum emortuorum vestitum; folia oblanceolata, in petiolum angustata, omnia radicalia, rosulata, 4—5 cm lg., ca. 4 mm lt., scapi aphylli. Sepala lilacino-viridia, membranaceo-albo vel lilacino-marginata, ca. 9 mm lg.; petala lilacina, late-obcordata, unguiculata, 22—25 mm lg., ungue calycem valde superante; pedicelli floriferi 9—12 mm lg.

647 Area geogr.: ad rupes Asiae Mediae, Talass-Alatau.

Typus: vallis fl. Kisch-ak-su prope ostium fl. Bugulen-ssai, ca. 2800 m. 11 VII 1933 fl. Leg. Linczewsky; in herb. Ac. Sc. URSS conservatur.

A caeteris spiciebus *Parryae* generis statura pumila caespitosa et glaucescentia praesertim differt.

36. **P. surculosa** N. Busch sp. nova.

Perennis, tota usque ad calycem et siliquas cana propter pubescentiam densam pilis stellatis; rhizoma validum apice in ramos multos tenuiores, sed longissimos, interdum usque ad 30 cm longos ramosos partitum, apice residua foliorum vetustorum emortuorum et rosulas foliorum vivas gerens. Folia obtusa, spathulato-oblonga, basi in petiolum latum attenuata. Scapi aphylli, flores 10—15 et plures ferentes; flores parvi, sepala orbiculato-lateovata, apice rotundata, margine membranaceo-pellucida, purpureo-viridia, ca. 3 mm lg., ca. 2 mm lt.; petala obovata, apice rotundata, alba, fauce purpurea, ca. 6 mm lg., ca. 3 mm lt., ungue sepalis breviore; pedicelli fructiferi ca. 7—10 mm lg.; siliquae 12—20 mm lg., ca. 2 mm lt., stylus ca. 1.5—2 mm lt.

Area geogr.: in schistosis mobilibus Asiae Mediae montium Pamiro-Alai (Schugnan).

Typus: Schugnan, in ascensu a Kaldok ad jugum Abchary. 2 VIII 1894 fl. defl. Fedtsch.; in herb. Ac. Sc. URSS conservatur.

Ab aliis speciebus ramis rhizomatis longissimis et pubescentia tomentosa bene differt.

MALCOLMIA R. BR.

37. **M. bucharica** Vass. sp. nova.

Planta annua, 40—50 cm longa, a basi ramosissima, ramis longis strictis, pilis rigidis patulis et minoribus bifurcatis obsitis. Folia caulina oblongo-lanceolata vel oblonga, margine paucidentata vel integerrima, breviter petiolata, pilis bifurcatis obsita. Sepala oblonga, pilosa, 2—3 mm longa. Petala roseo-caesia, 5—6 mm longa, lineari-spathulata. Siliquae numerosae, rectae, compressae, strictae, seminibus raris et remotis, margine incrassatae, pilis rigidis obsitae vel superiores laeves. Valvae siliquarum interne nigrae. Stigma obtusum, incrassatum, subcapitatum. Semina elliptica, 1.2—1.5 mm longa.

Hab.: in vallibus argillosis salinis Asiae Mediae australis.

Typus: vallis Schirabad (Usbekistan, Asia Media), prope vall. Nauschichar, I. P. Popov, 12 VI 1916, n° 14; in herb. Ac. Sc. URSS conservatur.

A *M. grandiflora* (Bge.) O. Ktze. petalis brevioribus, siliquis brevioribus et latioribus margine incrassatis differt.

38. **M. multisiliqua** Vass. sp. nova.

Caules 8—30 cm alti, tenues, ramosi, pilis bifurcatis numerosis obsiti. Folia oblonga, parva, integerrima vel plus minus sinuato-dentata, pilosa. Sepala

648 lineari-lanceolata, ca. 3 mm longa; petala roseo-caesia, linearia, spathulata, 6—7 mm longa, ca. 0.8—1 mm lata. Siliquae numerosae, rectae, breves, 20—30 (35) mm longae, ca. 1 mm latae, strictae, pilis ramosis et simplicibus numerosis obsitae, stigma breve, carnosum, obtusum, pedicelli breves (1—1.5—1.75 mm longi).

Area geogr.: in vallibus lapidosis salinis Pamiro-Alaicis (Tadshikistan).

Typus: Tadshikistan, prope fl. Bartang (v. Sumtschani-Bagu), 12 VIII 1904, B. A. Fedtschenko It. Turkest.; in herb. Ac. Sc. URSS conservatur.

A *M. scorpioide* (Bge.) Boiss. siliquis erectis et brevioribus numerosis strictis differt.

MATTHIOLA R. BR.

39. **M. bucharica** Czernjak. sp. nova.

Annua, 4—10 cm alta, caulis rectus, simplex v. ramosus, dense stellulato-pilosus; folia oblonga, dentata v. subintegerrima. Sepala 8—10 mm lg., oblonga, pilosa; petala roseo-coerulea (initio flavescentia), 18—25 mm lg., 5—8 mm lt.; pedicelli fructiferi incrassati, 4—5 mm lg.; siliquae 30—45 mm lg., 2—3 mm lt., stellulato-pilosae; stigmate incrassato, basi bituberculato; semina ovata.

Hab.: in semidesertis argillosis et arenosis salsis Asiae Mediae.

Typus: Asia Media, prope Kabadian, ad fl. Wachsch ripam dextram (Tadshikistania austr.) 200 m, 29 IV 1883. A. Regel, It. Turkest.; in herb. Ac. Sc. URSS conservatur.

A *M. Stoddarti* Bge. pedicellis longioribus (4—5 mm, nec 1—2 mm longis) et petalis majoribus differt.

TETRACME BGE.

40. **T. pamirica** Vass. sp. nova.

Annua, 20—50 cm alta, a basi ramosa, ramis adscendentibus, pilis bifurcatis pubescentibus; folia oblonga, integerrima v. parce dentata. Sepala ovata, 0.8—1 mm lt., petala paulo longiora; pedicelli fructiferi ca. 1 mm lg., apice incrassati; siliquae 10—13 mm lg., ca. 1.5 mm lt., lineares, axi adpressae, apice breviter (ca. 1 mm lg.) quadricornes; semina 1—2 mm lg., griseo-lutea.

Area geogr.: Asia Media, Pamir occidentalis, in vallibus lapidosis usque ad 2500 m s. m.

Typus: Asia Media. Inter p. Kazidich et Schambedeh, in siccis ad fl. Pandsch ca. 2200 m. 1 VIII 1901, Alexeenko, n° 3432; in herb. Ac. Sc. URSS conservatur.

A *T. quadricorni* Bge. siliquis erectis et longioribus (10—13 mm nec 6—8 mm longis) differt.

Sepala recta, lateralia leviter saccata, omnia violacea. Petala violacea, longiunguiculata. Stamina libera, edentula. Glandulae nectariferae ad basin staminum breviorum polygonales, annuliformes, intus ad stamina longiora appendices mittentes. Ovarium sessile, stylus brevissimus, stigma breviter bilobum. Siliqua dehiscens, plana, valvae uninerviae. Septum enerve, cellulis epidermalibus irregularibus membranis parallelis numerosis. Semina uniseriata, orbiculata, ala lata membranacea cincta. Cotyledones planae. Embryo pleurorhizus. — Planta perennis dense tomentosa, praeterea glandulas pedicellatas numerosas ferens.

Genus inter *Anchonium*, *Matthiolam* et *Parryam* intermedium.

41. **I. hissarica** N. Busch sp. nova. — *Anchonium elychrysifolium* var. *violacea* Ком. Мат. к Фл. Туркест. нагор. (1896) 113.

Rhizoma 1.5—2 cm crassum, lignosum, valde ramosum, ramus unusquisque rosulam foliorum ferens, scapi foliaque dense albo-tomentosi pilis stellatis et glandulis pedicellatis, ad margines foliorum densissimis. Scapi aphylli, 7—12 cm alti, fructiferi 9—20 cm; folia sessilia, oblanceolata, apice subito acutata, 2—3.5 cm lg., usque ad 5 mm lt. parte superiore. Racemi 5—10-flori, sepala oblonga, margine membranacea, 7—8 mm lg., 1.5—2.5 mm lt., pilis valde ramosis pubescentia et glandulas longiuscule pedicellatas gerentia, petala unguiculata, 10—12 mm lg., lamina anguste-obovata, 7—10 mm lg., 4—6 mm lt., pedunculi fructiferi 6—25 mm lg.; siliqua pilis stellatis pubescens et glandulas magnas brevipedicellatas ferens ad valvulas et ad replum, 3—5 cm lg., 5—7 mm lt.; semina atro-brunnea, tenuissime punctulata, ca. 4.5 mm lg., ca. 3 mm lt., cum ala ca. 6 mm lg., ca. 4.5 mm lt.

Hab.: in rupestribus, 2200—2800 m.

Area geogr.: Asia Media: Pamiro-Alai (montes Hissar).

Typus: Kara-kul, Kul-i-Kalan, jugum Lachcza. Leg. V. L. Komarov, A. Regel, Gontscharov et alii; in herb. Ac. Sc. URSS conservatur

DRABA (DILL.) L.

42. **D. Behringii** Tolm. sp. nova.

Perennis, dense caespitosa. Folia rosularia plana oblonga interdum subovalia, 5—8 mm longa, 2—3 mm lata, basi parum attenuata obtusiuscula integra, margine pilis rigidis simplicibus dense ciliata, subtus pilis simplicibus furcatisque, supra simplicibus ± dense vestita; scapi humillimi, floriferi 0.5—1 cm alti, rosulam foliorum vix superantes, pilosissimi. Racemus confertus

650 pauciflorus; pedunculi breves, pilis simplicibus furcatisque densissime obtecti; sepala ovalia pilis simplicibus paucis vestita; petala flava oblongo-spathulata obtusa, ca. 3 mm longa; spiculae (bene evolutas non vidi!) verosimiliter breves.

Typus: in decliviis glareosis montium insulae Mednyi (Cupreae) maris Behringiani, leg. A. J. Kardanov 11 VI 1930; in herb. Ac. Sc. URSS conservatur.

Species *D. macrocarpae* Adams, *D. alpinae* L. et *D. oreadi* Schr. affinis.

43. **D. Lipskyi** Tolm. sp. nova.

Perennis caespitosa. Folia rosularia oblongo-obovata basi parum attenuata apice obtusa vel acutiuscula integra, 10—18 mm longa, 3—6 mm lata, pilis mollibus ramosis stellatisque densissime obtecta; scapi aphylli (rarissime monophylli) floriferi humillimi, fructiferi usque ad 6 cm alti, pilis mollibus ramosis vestiti. Racemus 2—7-florus, floriferus subconfertus, fructiferus valde elongatus; pedunculi dense pilosi; sepala anguste-ovalia pilosa; petala flava oblongo-obovata, apice rotundata, ca. 6 mm longa; siliculae subpatentes quam pedicelli longiores vel subaequilongae, ovatae, ovaliae vel late-ovaliae, 6—13 (cum stylo 8—15) mm longae, 4—6 mm latae, pilis brevibus simplicibus furcatisque obtectae, stylo conspicuo ca. 2 mm longo apiculatae.

Typus: in montibus Tjan-Schan occidentalibus Asiae Mediae, ad flumen Saja-Ispai, leg. Smirnova 1 VIII 1928; in herb. Ac. Sc. URSS conservatur.

Obs. Species *D. hissaricae* Lipsky et *D. Arsenievi* (B. Fedtsch.) Gilg maxime affinis.

44. **D. baicalensis** Tolm. sp. nova.

Perennis, dense caespitosa. Folia densius rosulata, oblongo-obovata vel oblonga acutiuscula integra vel margine dentibus 1—3 inconspicuis instructa, basi parum attenuata, utrinque pilis rigidis simplicibus dense hirsuta, margine ciliata, 5—10 mm longa, 1.5—3 mm lata; scapi aphylli vel 1—3-foliati, erecti vel suberecti, pilis simplicibus furcatisque (mollioribus ramosis intermixtis) vestiti. Racemus 5—13-florus, floriferus subconfertus, fructiferus valde elongatus; pedunculi dense pilosi; sepala anguste-ovata, pallida, pilis simplicibus furcatisque pilosa; petala alba oblongo-obovata, obtusa vel subemarginata, 3.5—4 mm longa; siliculae (immaturae!) ellipticae vel ovato-ellipticae quam pedicelli breviores vel aequilongae, pilis brevibus simplicibus furcatisque obtectae, stylo 0.3—0.4 mm longo coronatae.

Typus: in peninsula Svjatoi Nos ad lacum Baical, in loco glareoso in cacumine montis, 1500—1600 m. Leg. J. Larin et G. Kanevski. 12 VI 1916; in herb. Ac. Sc. URSS conservatur.

Obs. Species *D. parviflorae* Schulz verosimiliter maxime affinis.

45. **C. aculeolata** (N. Busch) Czernjak. — *C. juncea* var. *aculeolata* N. Busch in Fl. cauc. crit. III, 4 (1908) 299.

Perennis, caulis rectus, 45—65 cm altus, cylindricus, fere a basi ramosus, aculeolis sparsis retrorsum curvatis firmis in toto caule dispersis obsitum; folia glauca, breviter adpresse rigido-pilosa, inferiora oblongo-ovata, 15—30 cm lg., breviter petiolata, lyrato-pinnato-lobata, ad marginem inaequaliter dentata, caulina media ambitu ovato-rhomboidea, inaequaliter erosa, basi cuneata, superiora subintegra, lanceolata, cum mediis margine acute serrata; summa lanceolato-subulata, apice ramulorum subulata, vix conspicua; petioli foliorum et nervi laminae infra pilos retrorsum spectantes aculeoliformes gerentes. Inflorescentia pyramidali-paniculata, apice ramulorum aculeolata; flores albi; sepala ca. 3 mm lg., apice rotundata, margine membranacea; petala oblongo-obovata, 4.5 mm lg., filamenta staminum majorum longa, denticulo minuto obsita; germen ovatum.

Area geogr.: Transcaucasia meridionalis, Irania bor.

Typus: respublica Nachiczevan, prope Belev 17 VI 1871 fl. fr. imm. Leg. Radde; in herb. Ac. Sc. URSS conservatur.

A *C. juncea* praesertim aculeis caulem, petiolos et nervos foliorum tegentibus differt.

LEPIDIUM L.

46. **L. Boissieri** N. Busch sp. nova. — *L. propinquum* var. *auriculatum* Boiss. Fl. Or. I (1867) 357. — *L. chalepense* var. *auriculatum* N. Busch in Fl. cauc. crit. III, 4 (1907) 93. — *L. draba* ssp. *chalepense* Thell. Monogr. Lepidium (1906) 86, 88, 89.

Perenne, canescens v. viride, pubescentia densa v. nulla; caules erecti, apice corymboso-ramosi; folia oblonga, eroso-dentata, radicalia in petiolum attenuata, caulina basi acutesagittata, lanceolata, v. late lanceolata, supra basin non angustata. Petala alba, 3 mm lg.; siliculae orbiculato-ovatae, villosae, compressae, basi rotundatae v. subangustatae, non cordatae, apice rotundato-subangustatae, 4.5 mm lg., 4 mm lt., valvis carinatis, vix inflatis; stylo 1.25 — 1.3 mm lg.

Area geogr: Caucasus meridionalis (Armenia), Turciae loca adjacentia.

Typus: Armenia, Koschadara, in lapidosis et glareosis. Leg. Szovits; in herb. Ac. Sc. URSS conservatur.

L. chalepensi L. et *L. propinquo* Fisch. et Mey. affines, a primo praesertim foliis basi acute sagittatis, ab ultimo silicula pubescente ovata, nec orbiculata bene differt.

652 47. **L. Borsczovi** N. Busch sp. nova. — *L. Aucheri* var. *Borsczovi* Rgl. Suppl. II ad Rgl. et Herd. Enum. pl. Semen. (1870) n° 118, p. 43.

Annuum, pumilum, caulis 1.5—8 cm altus, a collo paniculato-patentim ramosum, procumbens, subglaber v. apice cum ramis, pedicellis et foliorum petiolis pilis brevissimis aculeiformibus adspersus; folia radicalia rosulata, oblonga, usque ad medium irregulariter pinnatifida lobis rotundatis obtusis; petiolis alatis brevibus; caulina rhomboideo-ovata, basi cuneato-angustata, dentibus utrinque binis. Racemi breves densiflori, flores parvi, sepala late ovalia, obtusiuscula, membranacea, trinervia, corollae aequilonga; siliquae ovatae, 2.5—3 mm lg., 2 mm lt., numerosae, in racemo spiciformi imbricatae, apice alatae, triangulatim profunde (0.3—0.75 mm) emarginatae, dentibus subdivergentibus; stylo brevissimo tertiam partem emarginaturae aequante; pedicelli fructiferi 1.5—2 mm lg.; semina rufescentia, elliptico-ovata, tenuissime striata, ca. 1.5 mm lg., 0.8 mm lt.

Area geogr.: Asia Media et Sibiria occidentalis, in salsis argillosis.

Typus: Turcomania, Kara-kum, desertum Karry-bent. 26 IV 1895 fl. fr. imm. Korshinsky; in herb. Ac. Sc. URSS conservatur.

Ab aliis speciebus *Lepidii* generis racemo spiciformi siliculis axi arcte adpressis optime differt.

STROGANOVIA KAR. et KIR.

48. **S. Trautvetteri** Botschan. sp. nova.

Perennis, radix pluriceps, caules 15—30 cm alti, basi 3—5 mm diametro, glabri, sulcati, cylindrici; folia rosularum recta, plana, 2.5—6 cm lg., 0.7—2 cm lt., glaucescentia, elongato-obovata, basi late cuneata (subsessilia) apice acutata; nervo medio infra caeteris crassiore; folia caulina sessilia, subdecurrentia, subspathulata, apice breviter acutata, auriculis rotundatis minimis, nervo medio caeteris crassiore. Pedicelli glabri, siliculis aequilongi; silicula (cum stylo) 5—9 mm lg., stylus 1—1.5 mm lg., valvae nervo medio manifesto percursae; semina ochracea, ovata, ca. 3 mm lg., ca. 4.5 mm lt. VII—VIII.

Hab.: in salsis.

Area geogr.: Asia Media (Balchasch, Betpak-dala).

Typus: ad lacum Balchasch. 1843. Leg. Schrenk; in herb. Ac. Sc. URSS conservatur.

Ab affini *S. intermedia* Kar. et Kir. foliorum forma, a *S. brachyota* Kar. et Kir. foliorum nervatione, a *S. gracili* Pavl. stylo longiore differt.

CAMELINA CRANTZ.

49. **C. caucasica** (Sinsk.) Vass. sp. nova. — *C. sativa* Crantz. var. *caucasica* Sinsk. Тр. прикл. бот., ген. и сел. 2, XIX (1928) 544.

Annua, 40—50 cm alta, caulis rigidus, a basi ramosus, ramis longis strictis, pilis ramosis dense obtectus; folia caulina longa, lineari-lanceolata, 653 sessilia, basi breviter sagittata. Sepala oblongo-lanceolata, ca. 3 mm lg.; petala linearia, apice paulo dilatata, ca. 5 mm lg.; pedicelli tenues, 10—15 mm lg., stricti; siliculae numerosae, 9—10 mm lg., 4—5 mm lt., valvis angustis, retusis, tenuiter reticulatis, costa media tenui; stylus 1.2—1.8 mm lg.; semina brunneo-rubella, opaca, 1.8—2 mm lg.

Area geogr.: Transcaucasia orientalis et australis. Planta ruderalis inter segetes *Lini* crescens.

Typus: Turcia, distr. Kaghysman, vall. Chorassan, culta. W. Massalsky, Plantae Armenae, 1886; in herb. Ac. Sc. URSS conservatur.

A *C. linicola* Sch. et Sp. caulibus valde ramosis et pilosis differt, a caeteris speciebus *Camelinae* generis siliculis majoribus et longioribus, valvis angustis retusis diversa.

RESEDA L.

50. **R. hemithamnodes** Czernjak. sp. nova.

Perennis, caules infra usque ad 1.5 cm diametro, ramosi, interdum adscendentes, ramis 45—90 cm lg., albidi, tenuiter costati; folia glauca, oblongo-lanceolata, utrinque angustata, breviter petiolata, glabra, lamina 3—5.5—6.5 cm lg., 7—15 mm lt., petiolus 1 cm lg., folia juniora cum caule sparse papilloso-puberula. Racemi usque ad 25 cm lg., densissimi, axi glabra; flores breviter pedicellati; sepala 6, ca. 3 mm lg., petalis breviora; petala 6 aurea, superiora 7-fida lobis spathulato-oblongis obtusis, lobo medio longiore, inferiora trifida; pedicelli fructiferi 2 mm lg.; capsulae usque ad 9 mm lg., gynophoro insidentes, obovatae, basin versus angustatae, glabrae, dense imbricatae; semina 1 mm diametro, brunneola, leviter ruguloso-foveolata, reniformia, opaca.

Area geogr.: Asia Media, Pamiro-Alai.

Typus: Usbekistania, vallis Vachsch, infra Sengtod et Tutkaul, in decliviis argillosis, in rupestribus et glareosis. 30 VI 1897. Leg. Lipsky; in herb. Ac. Sc. URSS conservatur.

R. Alphonsi J. Muell. proxima, sed racemo densiore, pedicellis brevioribus et petalorum forma dignoscitur.

51. **R. dshebeli** Czernjak. sp. nova.

Annua, tota sparse breviter papilloso-puberula, caules 1—3, usque ad 40—45 cm alti, recti, interdum adscendentes, a basi ramosi; folia glaucescentia, lanceolata, breviter petiolata, cum petiolo 3—4 cm lg., 3—6 mm lt., acutiuscula, caulina superiora anguste-lanceolata, inferiora nonnulla latiora, usque ad 12 mm lt., interdum lobis 1—2 lateralibus. Racemi laxi, fructiferi valde elongati, usque ad 20 cm lg.; bracteae subulatae, pedicello longiores; sepala et stamina caduca; sepala 6 oblongo-ovata, obtusa, ca. 3 mm lg. petala 5—6-loba; capsulae tridentatae in pedicellis fructiferis erecto-patentibus 5 mm longis; semina 1 mm lg., nigra, nitida, minute-alveolata.

654 Area geogr.: Turcomania montana (montes Kopet-dagh), Iran septentrionalis.

Typus: Kopet-dagh, Dshebel, in glareosis promontorii 16 V 1912 fl. fr. Leg. Androsow; in herb. Ac. Sc. URSS conservatur.

R. microcarpae J. Muell. proxima, sed foliorum forma, caule saepius recto, pubescentia papillosa et pedicellis fructiferis longioribus differt.

52. **R. brevipedunculata** N. Busch sp. nova. — *R. globulosa* var. *brevipedunculata* N. Busch in Fl. cauc. crit. III, 4 (1910) 739.

Annua; caules humiles, 12—30 cm alti, adscendentes, ramosi; folia 3—5-partita, lobis anguste-linearibus, praesertim ad marginem, ad laminam infra et ad petiolum atque ad angulos caulis pubescentia brevissima adest. Racemi laxi, ovato-oblongi, serius elongati, 5—33 cm lg., sepala oblongo-lanceolata, 1.2—2.2 mm lg.; petala albida v. ochroleuca, 3—4 mm lg.; filamenta staminum scabridula; pedicelli fructiferi breves, usque ad 3 mm lg., cauli adpressi, scabriduli; capsulae ad angulos puberulae, globosae, subcompressae, 3.5—4.5 mm lg., 5—7.5 mm lt.; semina brunnea, nitida, glabra, 1.5 mm lg., 1 mm lt.

Area geogr.: Caucasus, Daghestania.

Typus: Daghestania, prope Achty, in decliviis calcareis siccis, 300—1100 m. 1874 et 1880 leg. Becker; 26 VII 1898 fl. fr. Alexeenko; in herb. Ac. Sc. URSS conservatur.

R. globulosae affinis, sed pubescentia brevissima ad folia, ad angulos caulis et capsulae atque pedicellis brevioribus bene differt.

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VEGETATION REGIONS OF THE USSR

Abbreviated name	Full name
I. Arctic	
1. Arc. Eur.	Arctic (European part)
2. Nov. Z.	Novaya Zemlya
3. Arc. Sib.	Arctic (Siberia)
4. Chuk.	Chukchi
5. An.	Anadyr
II. European part	
6. Kar.-Lap.	Karelia-Lapland
7. Dv.-Pech.	Dvina-Pechora
8. Balt.	Baltic States
9. Lad.-Ilm.	Ladoga-Il'men
10. U. V.	Upper Volga
11. V.-Kama	Volga-Kama
12. U. Dnp.	Upper Dnieper
13. M. Dnp.	Middle Dnieper
14. V.-Don.	Volga-Don
15. Transv.	Transvolga area
16. U. Dns.	Upper Dniester
17. Bes.	Bessarabia
18. Bl.	Black Sea area
19. Crim.	Crimea
20. L. Don	Lower Don
21. L. V.	Lower Volga
III. Caucasus	
22. Cisc.	Ciscaucasia
23. Dag.	Dagestan
24. W. Transc.	Western Transcaucasia
25. E. Transc.	Eastern Transcaucasia
26. S. Transc.	Southern Transcaucasia
27. Tal.	Talysh
IV. West Siberia	
28. Ob	Ob region (from the eastern slopes of the Urals to the Yenisei River)
29. U. Tob.	Upper Tobol

30. Irt.	Irtysh
31. Alt.	Altai

V. East Siberia

32. Yenis.	Yenisei
33. Lena-Kol.	Lena-Kolyma
34. Ang.-Say.	Angara River-Sayans
35. Dau.	Dauria

VI. Far East

36. Kamch.	Kamchatka
37. Okh.	Okhotsk
38. Ze.-Bu.	Zeya-Bureya
39. Uda	Uda River area
40. Uss.	Ussuri
41. Sakh.	Sakhalin

VII. Soviet Central Asia

42. Ar.-Casp.	Aral-Caspian
43. Balkh.	Lake Balkhash area
44. Dzu.-Tarb.	Dzungaria-Tarbatagai
45. Kyz. K.	Kyzyl-Kum
46. Kara K.	Kara-Kum
47. Mtn. Turkm.	Mountainous part of Turkmenistan
48. Amu D.	Amu Darya
49. Syr D.	Syr Darya
50. Pam.-Al.	Pamir-Alai
51. T. Sh.	Tien Shan

Accepted Regions for Indication of General Distribution of Species Appearing in "Flora of the U. S. S. R."

I. Arc.	Arctic (Spitsbergen, Greenland and farther)
II. Scand.	Scandinavia (Norway, Denmark, Sweden, Finland)
III. Centr. Eur.	Central Europe (Germany, Poland, Czechoslovakia, Hungary, Austria, Switzerland)
IV. Atl. Eur.	Atlantic Europe (Netherlands, Belgium, England, France, Portugal)
V. Med.	Mediterranean (including North Africa)
VI. Bal.-As. Min.	Balkan Peninsula and Asia Minor
VII. Arm.-Kurd.	Lesser Armenia and Kurdistan
VIII. Iran.	Iran and Afghanistan
IX. Ind.-Him.	India and Himalayas
X. Dzu.-Kash.	[Dzungaria-Kashgar area] Eastern or Chinese Turkestan (Sinkiang)

XI.	Mong.	Mongolia
XII.	Jap.-Ch.	Japan and China
XIII.	Ber.	North American coast of the Bering Sea
XIV.	N. Am.	North America (U. S. A. and Canada)
XV.	Tib.	Tibet

Other Geographical Abbreviations

Afr.	Africa
Aust.	Australia
Centr.	Central
E.	East(ern)
Gr.	Great, Greater
I.	Island
Is.	Islands
Mt.	Mount
Mts.	Mountains
N.	North(ern)
R.	River
S.	South(ern)
W.	West(ern)

TRANSLATOR'S NOTE

1. The Russian term "Srednyaya Aziya" is, in English, Central Asia (or Soviet Central Asia). Therefore the term Middle Asia has been used for Russian "Tsentral'naya Aziya," which is non-Soviet inner Asia, comprising western China (Sinkiang and Tibet) and Mongolia.

2. According to Russian usage, the European part of the USSR is "eastern Europe." Therefore "western Europe" includes the whole of Europe outside the USSR.

EXPLANATORY LIST OF ABBREVIATIONS OF RUSSIAN INSTITUTIONS AND PERIODICALS APPEARING IN THIS TEXT

Abbreviation	Full name (transliterated)	Translation
Bot.-geogr. issled. v Turkest.	Botaniko-geograficheskie issledovaniya v Turkestane	Botanical and Geographical Investigations in Turkestan
Bot. Mat. Gerb Bot. inst. AN SSSR	Botanicheskie Materialy Gerbariya Botanicheskogo instituta AN SSSR	Botanical Materials of the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR
Bot. Mat. Gerb. Gl. Bot. Sada	Botanicheskie Materialy Gerbariya Glavnogo Botanicheskogo Sada	Botanical Materials of the Herbarium of the Main Botanical Gardens
Bot. zap. SPb. univ.	Botanicheskie zapiski Sankt-Peterburgskogo universiteta	Botanical Notes of St. Petersburg University
Bot. zhurn. SSSR	Botanicheskii zhurnal SSSR	Botanical Journal of the USSR
Byull. Glavn. Bot. Sada	Byulleten' Glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Byull. Obshch. lyubit. estestvozn., antrop. i etnogr.	Byulleten' Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Byull. Voronezh. obshch. estestv.	Byulleten' Voronezhskogo obshchestva estestvoispytatelei	Bulletin of the Voronezh Society of Naturalists
Dendr.	Dendrarii	Arboretum
Der. i kust.	Derev'ya i kustarniki	Trees and Shrubs
Der. i kust. Kavk.	Derev'ya i kustarniki Kavkaza	Trees and Shrubs of the Caucasus
Dikie polezn. i technich. rasteniya SSSR	Dikie poleznye i tekhnicheskie rasteniya SSSR	Useful Wild Plants and Industrial Crops of the USSR
Dikorastushchie r. Kavkaza, ikh rasprostranenie, svoistva i primenenie	Dikorastushchie rasteniya Kavkaza, ikh rasprostranenie, svoistva i primenenie	Wild Plants of the Caucasus, Their Distribution, Properties and Uses
Dokl. AN Azerb. SSR	Doklady Akademii Nauk Azerbaidzhanskoi SSR	Reports of the Academy of Sciences of the Azerbaijan SSR

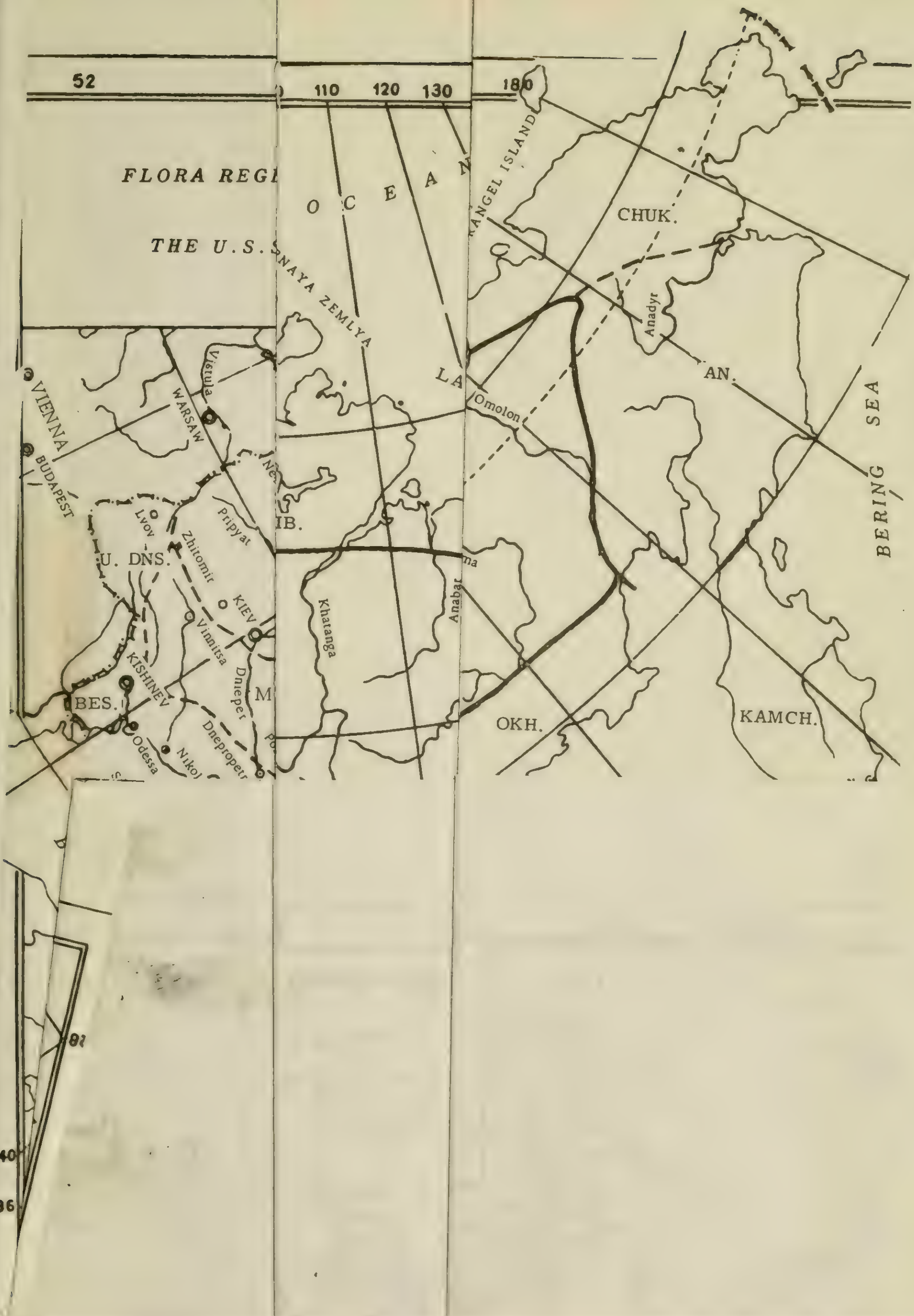
Fl.	Flora	Flora
Fl. Abkh.	Flora Abkhazii	Abkhasian Flora
Fl. Almat. zapovedn.	Flora Alma-Atinskogo zapovednika	Flora of the Alma-Ata Reserve
Fl. Alt.	Flora Altaya	Altai Flora
Fl. Alt. i Tomsk. gub.	Flora Altaiskoi i Tomskoi gubernii	Flora of Altai and Tomsk Provinces
Fl. Az. Ross.	Flora Aziatskoi Rossii	Flora of Asiatic Russia
Fl. Evrop. Rossii	Flora Evropeiskoi Rossii	Flora of European Russia
Fl. Gruzii	Flora Gruzii	Georgian Flora
Fl. Kamch.	Flora Kamchatki	Kamchatkan Flora
Fl. Kavk.	Flora Kavkaza	Caucasian Flora
Fl. Man'chzh.	Flora Man'chzhurii	Manchurian Flora
Fl. Mosk. gub.	Flora Moskovskoi gubernii	Flora of Moscow Province
Fl. Sev. Kraya	Flora Severnogo Kraya	Flora of the Northern Territory
Fl. Sakh.	Flora Sakhalina	Flora of Sakhalin
Fl. Sib.	Flora Sibiri	Siberian Flora
Fl. Sib. i Dal'n. Vost.	Flora Sibiri i Dal'nego Vostoka	Flora of Siberia and the Far East
Fl. Sr. Ross.	Flora srednei Rossii	Flora of Central Russia
Fl. Talysh.	Flora Talysha	Talysh Flora
Fl. Tsentr. Kazakhst.	Flora Tsentral'nogo Kazakhstana	Flora of Central Kazakhstan
Fl. Vost. Evr. Ross.	Flora Vostochnoi Evropeiskoi Rossii	Flora of East European Russia
Fl. Yugo-Vost.	Flora Yugo-Vostoka	Flora of the Southeast
Fl. Yugo-zap. Ross.	Flora Yugo-zapadnoi Rossii	Flora of Southwest Russia
Fl. Yur. bot.-sada	Flora Yur'evskogo botanicheskogo sada	Flora of Yur'ev Botanical Garden
Fl. Zap. Sib.	Flora Zapadnoi Sibiri	Flora of West Siberia
Gerb. donsk. fl.	Gerbarii donskoi flory	Herbarium of Don Flora
Gerb. Orlovsk. gub.	Gerbarii Orlovskoi gubernii	Herbarium of Orel Province
Gerb. Ukr. fl.	Gerbarii Ukrainskoi flory	Herbarium of Ukrainian Flora
GRF	Gerbarii Russkoi Flory	Herbarium of Russian Flora
Ill. Fl. Mosk. gub.	Illyustrirovannaya Flora Moskovskoi gubernii	Illustrated Flora of Moscow Province
Izv. AN SSSR	Izvestiya AN SSSR	Bulletin of the Academy of Sciences of the USSR
Izv. Bot. Sada	Izvestiya Botanicheskogo Sada	Bulletin of the Botanical Gardens
Izv. Bot. Sada Petra Vel.	Izvestiya Botanicheskogo Sada Petra Velikogo	Bulletin of Peter the Great Botanical Gardens
Izv. Gl. Bot. Sada	Izvestiya glavnogo Botanicheskogo Sada	Bulletin of the Main Botanical Gardens
Izv. Kavk. Muzeya	Izvestiya Kavkazskogo Muzeya	Bulletin of the Caucasian Museum

Izv. Kazakhst. fil. AN SSSR	Izvestiya Kazakhstanskogo Filiala Akademii Nauk SSSR	Bulletin of the Kazakhstan Branch of the Academy of Sciences of the USSR
Izv. Kievsk. Bot. Sada	Izvestiya Kievskogo Botanicheskogo Sada	Bulletin of the Kiev Botanical Gardens
Izv. Obshch. lyubit. estestvozn., antrop. i etnogr.	Izvestiya Obshchestva lyubitelei estestvoznaniya, antropologii i etnografii	Bulletin of the Naturalists', Anthropologists' and Ethnographers' Society
Izv. Tadzhik. Bazy AN SSSR	Izvestiya Tadzhikskoi Bazy Akademii Nauk SSSR	Bulletin of the Tadzhikistan Base of the Academy of Sciences of the USSR
Konsp. rast. okr. Khar'kova	Konspekt rastenii okruga Khar'kova	Compendium of Plants of Kharkov District
Korm. rast. Estestv. senokosov i pastb. SSSR	Kormovye rasteniya estestvennykh senokosov i pastbishch SSSR	Fodder Plants of Natural Hay Meadows and Pastures of the USSR
Lesn. zhurn.	Lesnoi zhurnal	Forestry Journal
Mat. (dlya) Fl. Kavk.	Materialy dlya Flory Kavkaza	Materials on Caucasian Flora
Mat. (dlya) fl. Sredn. Azii	Materialy dlya flory Srednei Azii	Materials on Soviet Central Asia Flora
Nov. obozr.	Novoe obozrenie	New Review
Ob. rast. Kievsk. uch. okr.	Obzor rastitel'nosti Kievskogo uchebnogo okruga	Survey of Vegetation in the Kiev Educational District
Och. obozr. i fl. Karpat	Ocherki rastitel'nosti i flory Karpat	Survey of Carpathian Vegetation and Flora
Ocherk. Tifl. fl.	Ocherki Tiflisskoi flory	Survey of Tiflis [Tbilisi] Flora
Opis. Amur. obl.	Opisanie Amurskoi oblasti	Description of the Amur Region
Opis. ist. razv. fl. vost. Tyan'-Shanya	Opisanie istorii razvitiya flory vostochnogo Tyan'-Shanya	Description of the History of the Development of Flora of Eastern Tien Shan
Opis. nov. rast Turk.	Opisanie novykh rastenii Turkestana	Description of New Plants of Turkestan
Opis. nov. vidov	Opisanie novykh vidov	Description of New Species
Opred. der. i kust.	Opredelitel' derev'ev i kustarnikov	Key to Trees and Shrubs
Opred. rast. Dal'nevost. kr.	Opredelitel' rastenii Dal'nevostochnogo Kraya	Key to Plants of the Far Eastern Territory
Opred. rast. Kavk.	Opredelitel' rastenii Kavkaza	Key to Caucasian Plants
Opred. vyssh.	Opredelitel' vysshikh rastenii	Key to Higher Plants
Opred. (vyssh.) rasten. Evrop. chasti SSSR	Opredelitel' (vysshikh) rastenii Evropeiskoi chasti SSSR	Key to Higher Plants of the European USSR

Perech. rast. Turk.	Perechen' rastenii Turkmenii	List of Turkmenian Plants
Pochv. eksped. v bass. r. Syr-Dar'i i Amu-Dar'i	Pochvennaya ekspeditsiya v basseiny rek Syr-Dar'i i Amu-Dar'i	Soil Science Expedition to the Syr-Darya and Amu-Darya River Basins
Putesh.	Puteshestviya	Travels
Rast. i fl. Karp.	Rasteniya i flora Karpat	Plants and Flora of the Carpathians
Rast. letn. pastb. Gandzh.	Rasteniya letnikh pastbishch Gandzhi	Vegetation of Gandzha [now Kirovabad] Summer Pastures
Rast. res. Turkm.	Rastitel'nye resursy Turkmenii	Plant Resources of Turkmenia
Rast. resursy Kavkaza	Rastitel'nye resursy Kavkaza	Plant Resources of the Caucasus
Rast. Sib.	Rastitel'nost' Sibiri	Vegetation of Siberia
Rast. Sr. Az.	Rastitel'nost' Srednei Azii	Vegetation of Soviet Central Asia
Rast. Zakasp. obl.	Rastitel'nost' Zakaspiiskoi oblasti	Vegetation of the Transcaspian Region
Rastit. Kavk.	Rastitel'nost' Kavkaza	Vegetation of the Caucasus
Rastit. pokrov. vost. Pamira	Rastitel'nyi pokrov vostochnogo Pamira	Plant Cover of the Eastern Pamirs
Rastit. syr'e Kazakhst.	Rastitel'noe syr'e Kazakhstana	Plant Resources of Kazakhstan
Rastit. zapovedn. Guralash i Zaaminks. lesn. ugodii	Rastitel'nost' zapovednika Guralash i Zaaminskikh lesnykh ugodii	Vegetation of Guralash Reserve and Zaamin Forest Lands
Rezul't dvukh puteshevstv. na Kavk.	Rezul'taty dvukh puteshestvii na Kavkaz	Results of Two Travels to the Caucasus
Russk. Fl.	Russkaya Flora	Russian Flora
Russk. lek. rast.	Russkie lekarstvennye rasteniya	Russian Medicinal Plants
Sbor, sushka i raz. lek. rast.	Sbor, sushka i razvitie lekarstvennykh rastenii	Gathering, Drying and Development of Medicinal Plants
Sorn. rast. SSSR	Sornye rasteniya SSSR	Weed Plants of the USSR
Sov. Bot.	Sovetskaya Botanika	Soviet Botany
Spis. rast.	Spisok rastenii	List of Plants
Tr. Bot. inst. AN SSSR	Trudy Botanicheskogo instituta AN SSSR	Transactions of the Botanical Institute of the Academy of Sciences of the USSR
Tr. Bot. Sada	Trudy Botanicheskogo Sada	Transactions of the Botanical Gardens
Tr. Bot. Sada Yur'evsk. Univ.	Trudy Botanicheskogo Sada Yur'evskogo Universiteta	Transactions of the Botanical Gardens of Yur'ev [now Tartu] University

Tr. Byuro prikl. Bot.	Trudy Byuro po prikladnoi botanike	Transactions of the Bureau of Applied Botany
Tr. Dal'nevost. bazy AN SSSR	Trudy Dal'nevostochnoi bazy AN SSSR	Transactions of the Far Eastern Base of the Academy of Sciences of the USSR
Tr. Inst. nov. lub. syr'ya	Trudy Instituta novogo lubyanogo syr'ya	Transactions of the Institute of New Fiber Raw Materials
Tr. Nauk.-Doslid. Inst. Bot. Khar. Derzh. Univ.	Trudy naukovo-doslidnoho instytutu botaniky Kharkivs'koho Derzhavnoho Universytetu	Transactions of the Botanical Research Institute of the Kharkov State University
Tr. Obshch. isp. prir. Khark'k. univ.	Trudy Obshchestva ispytatelei prirody Khar'kovskogo universiteta	Transactions of Naturalists' Society of Kharkov University
Tr. Obshch. sadov. v Odesse	Trudy obshchestva sadovodov v Odesse	Transactions of the Odessa Horticulturists' Society
Tr. odessk. obshch. sadov	Trudy Odesskogo obshchestva sadovodov	Transactions of Odessa Horticulturists' Society
Tr. Peterb. obshch. estestvoisp.	Trudy Peterburgskogo obshchestva estestvoispytatelei	Transactions of St. Petersburg Naturalists' Society
Tr. pochv.-bot. eksp. Peresl. upr.	Trudy pochvenno-botanicheskoi ekspeditsii Pereslavskogo upravleniya	Transactions of the Soil-Botanical Expedition of Pereslavl Administration
Tr. po geobot. obsled. pastb. Azerb.	Trudy po geobotanicheskim obsledovaniyam pastbishch Azerbaidzhana	Transactions of Geobotanical Investigations of Azerbaijan SSR Pastures
Tr. Odessk. otd. R. obshch. sadov.	Trudy Odesskogo otdeleniya Rossiiskogo obshchestva sadovodov	Transactions of Odessa Branch of the Russian Horticulturists' Society
Tr. prikl. bot. (gen. i sel.)	Trudy po prikladnoi botanike, genetike i selektsii	Transactions of Applied Botany, Genetics and Selection
Tr. Ross. Obshch. sadov.	Trudy Rossiiskogo obshchestva sadovodov	Transactions of the Russian Horticulturists' Society
Tr. SAGU	Trudy Sredneaziatskogo Gosudarstvennogo Universiteta	Transactions of the Soviet Central Asian State University
Tr. Sarat. obshch. estestvoisp.	Trudy Saratovskogo obshchestva estestvoispytatelei	Transactions of the Saratov Naturalists' Society
Tr. Sil'skogospod. komit. bot.	Trudy sil'skohospodar'skoho komiteta botaniky	Transactions of the Botanical Agricultural Committee
Tr. SPb. obshch. estestv.	Trudy Sankt-Peterburgskogo obshchestva estestvoispytatelei	Transactions of the St. Petersburg Naturalists' Society

Tr. Tadzh. bazy AN SSSR	Trudy Tadzhikskoi bazy AN SSSR	Transactions of the Tadzhikistan Base of the Academy os Sciences of the USSR
Tr. Tbil. bot. inst.	Trudy Tbilisskogo botanicheskogo instituta	Transactions of Tbilisi Botanical Institute
Tr. Tbil. (or Tifl.) bot. sada	Trudy Tbilisskogo (Tifliskogo) botanicheskogo sada	Transactions of the Tbilisi (Tiflis) Botanical Garden
Tr. Turkmensk. bot. sada	Trudy Turkmenskogo botanicheskogo sada	Transactions of the Turkmenian Botanical Garden
Tr. Turk. nauchn. obshch.	Trudy Turkmenskogo nauchnogo obshchestva	Transactions of the Turkmenian Scientific Society
Vest. Akad. Nauk (or AN) Kazakhsk. SSR	Vestnik Akademii Nauk Kazakhskoi SSR	Bulletin of the Academy of Sciences of the Kazakh SSR
Vestn. estestv. nauk	Vestnik estestvennykh nauk	Bulletin of Natural Sciences
Vestn. Ross. Obshch. sadov	Vestnik Rossiiskogo obshchestva sadovodov	Bulletin of the Russian Horticulturists' Society
Vest. Tifl. bot. sada	Vestnik Tiflisskogo botanicheskogo sada	Bulletin of Tiflis Botanical Garden
Visn. Kyyivsk. bot. sadu	Visnyk Kyyivs'koho Botanichnoho Sadu	Bulletin of the Kiev Botanical Garden
Vizn. (or Vznachn.) rosl. URSR	Viznachnyk roslyn URSR	Key to Plants of the Ukrainian SSR
V obl. polupustyni	V oblasti polupustyni	(In the) Semidesert Region
Yadov. rast. lugov i pastb.	Yadovitye rasteniya lugov i pastbishch	Poisonous Plants of Meadows and Pastures
Zam. po sist. i geogr. rast. Tbil. bot. inst.	Zametki po sistematike i geografii rastenii Tbilisskogo botanicheskogo instituta	Notes on Taxonomy and Geography of Plants of the Tbilisi Botanical Institute
Zam. po fl. EL'T	Zametki po flore El'tona	Notes on the Flora of Elton
Zap. Kievsk. Obshch. Estestv.	Zapiski Kievskogo obshchestva estestvoispytatelei	Reports of the Kiev Society of Naturalists
Zap. NOVOROSS. obshch. Estestv.	Zapiski Novorossiiskogo obshchestva estestvoispytatelei	Reports of the Novorossiisk Society of Naturalists
Zap. Russk. geogr. obshch.	Zapiski Russkogo geograficheskogo obshchestva	Reports of the Russian Geographical Society
Zhurn. Bot. obshch.	Zhurnal Botanicheskogo obshchestva	Journal of the Botanical Society
Zhurn. opytn. agron. Yugo-Vost.	Zhurnal opytnoi agronomii Yugo-Vostoka	Journal of Experimental Agronomy of the Southeast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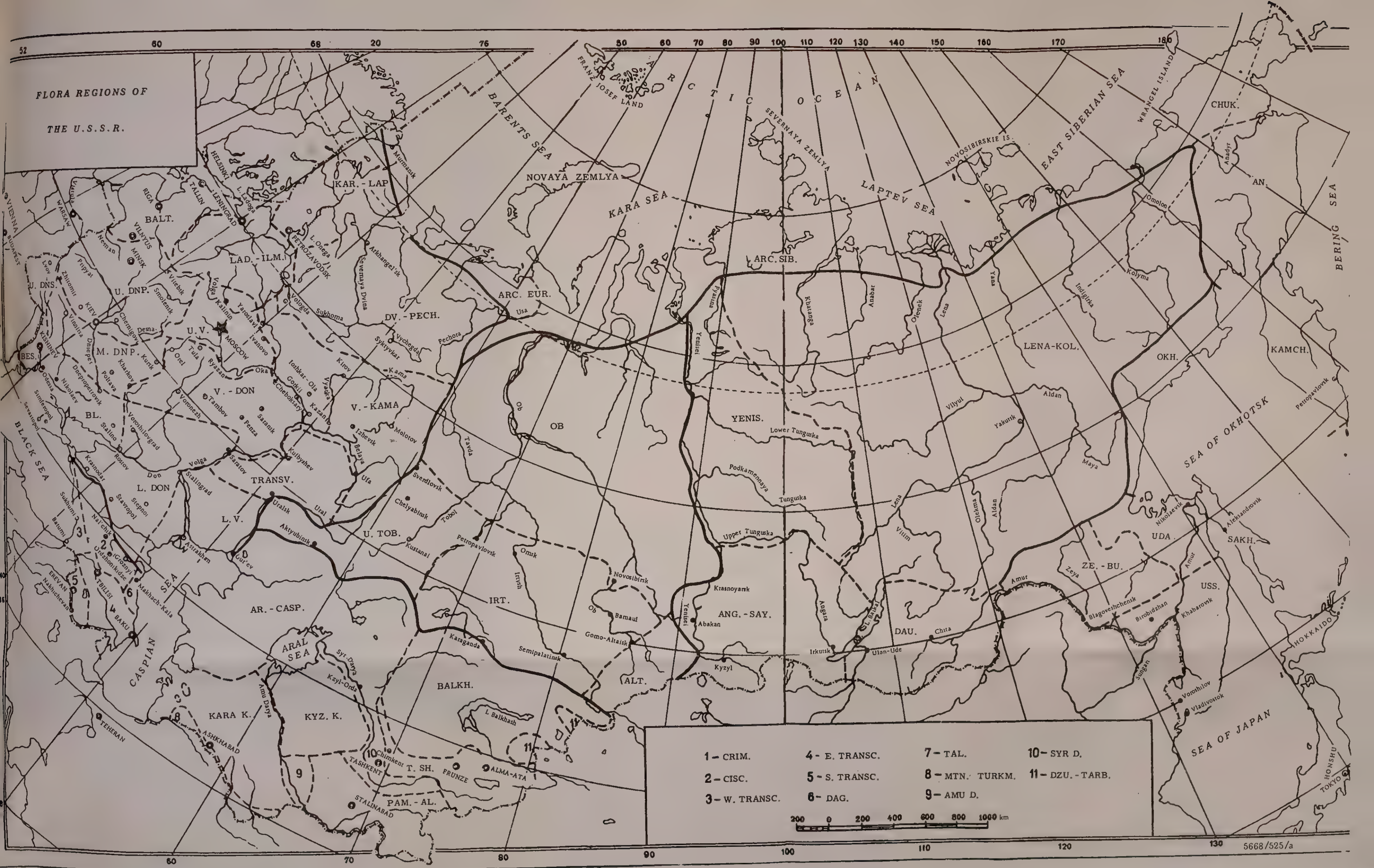

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